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Table of Contents

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ORIGINAL ARTICLES— PAGE.

"Communicable Diseases Common to Man and Animals," by MAX HENRY, M.R.C.V.S. 91

"Communicable Diseases Common to Man and Animals: Tetanus, Botulism, Anthrax," by H. R. SEDDON, D.V.Sc. 93

"A Survey of the Incidence of Echinococcus Granulosus (Batsch) or Hydatid Disease in New South Wales," by I. CLUNIES ROSS, B.V.Sc. 96

REVIEWS—

A Book for the Young Practitioner 103

A Textbook on Gynæcology 103

Recent Work in Dermatology and Syphilis 104

Artificial Pneumothorax Therapy 104

LEADING ARTICLES—

A Retrospect 105

ABSTRACTS FROM CURRENT MEDICAL LITERATURE—

Ophthalmology 110

Laryngology and Otology 111

BRITISH MEDICAL ASSOCIATION NEWS— PAGE.

Scientific 112

SPECIAL CORRESPONDENCE—

Canadian Letter 118

CORRESPONDENCE—

Dichotomy 119

PROCEEDINGS OF THE AUSTRALIAN MEDICAL BOARDS—

Victoria 120

Queensland 120

BOOKS RECEIVED 120

MEDICAL APPOINTMENTS VACANT, ETC. 120

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 120

DIARY FOR THE MONTH 120

EDITORIAL NOTICES 120

COMMUNICABLE DISEASES COMMON TO MAN AND ANIMALS.[1]

By MAX HENRY, M.R.C.V.S.,

Chief Quarantine Officer (Animals) for New South Wales; Chief Veterinary Surgeon, Department of Agriculture, New South Wales.

IN opening such a session as this it would probably be considered necessary by many that some time should be devoted to an explanation of what were or might be the motives underlying the holding of a joint meeting of our Associations. I do not propose to do this, since the mere fact of your presence here tonight is sufficient evidence that you appreciate and understand the situation.

The subject set down for discussion—the communicable diseases common to man and animals—is one of vast extent and great importance from the economic and health points of view. Certainly the most important of such diseases, tuberculosis, has been omitted from the programme, probably because it alone would require more than one evening to discuss. Although the field of discussion has been limited to certain disease conditions, it is desirable before giving detailed attention to them to take a brief survey of the field in general to see what measures are taken to prevent the introduction of these diseases or to deal with them after their introduction.

The more important diseases which come within the scope of the proceedings of this meeting, omitting tuberculosis, are anthrax, glanders, actinomycosis, foot and mouth disease, rabies, malignant œdema, botulism, Malta fever, tetanus and various parasitic conditions such as trichinosis, the occurrence of the *Echinococcus granulosus*, *Tænia* infestation in man with its associated cystic conditions in cattle and pigs.

Australia has been extremely fortunate in remaining free from many of the more serious conditions mentioned above. This position is partly due to luck, since in the early days of settlement and for a subsequent period extending far into last century no measures whatever appear to have been taken to prevent the introduction of disease amongst stock, partly to the distance of Australia from exporting countries and partly to the system of quarantine

[1] Read at a joint meeting of the New South Wales Branch of the British Medical Association and the Veterinary Association of New South Wales on October 29, 1925. The papers read at this meeting will appear in *The Journal of the Australian Veterinary Association* as well as in this journal.

which has now been in operation for many years and which has on several occasions demonstrated its value in preventing the introduction of disease. It is a remarkable thing, for instance, that glanders never gained a footing in this country in the early days and very fortunate for Australia that when it was introduced there was on the spot in the person of the late Edward Stanley, Government Veterinarian, an official with a sound grasp of the position and the capacity to fight the very considerable opposition arrayed against him in his efforts to secure the extirpation of the disease. Suffice it to say that the disease was stamped out and has never gained a footing since. The present quarantine restrictions, the application of the mallein test and the circumscribed areas of the globe from which horses may be introduced, renders it very doubtful if it will ever become a danger. The experience of Great Britain and the British armies during the Great War show that the disease can be effectively eradicated providing sufficiently drastic action is taken. The destruction of all animals manifesting the disease, the testing and retesting of contacts, the slaughter of reactors and the thorough disinfection of infested stables will, if conscientiously carried out, result in the eradication of the disease.

Still more fortunate is this country in having remained free from rabies. The long period of incubation which has been recorded for this disease, makes it still more remarkable that no rabid animal should ever have been landed. The risk of introduction is not altogether obviated by quarantine laws, since the possibility of smuggling dogs in is obvious, especially in the north of Australia, where the veterinary quarantine services are not so strongly organized as in the southern States. Rabies would, if it gained a footing here, prove a more difficult proposition to handle than was the case in Great Britain, owing to the comparative lack of control of the canine population and might once it spread to the wild dog prove almost ineradicable.

Foot and mouth disease was apparently introduced on one occasion, but was promptly eradicated. Quarantine is now a Federal matter and is regulated by the provisions of the Commonwealth *Quarantine Act*, but practically all the officials engaged in animal quarantine are State officials to whose salaries the Commonwealth Government contributes. In each State the Chief Veterinary Surgeon of the State Department of Agriculture acts as Commonwealth Quarantine Officer (Animals). The present system of quarantine consists of what might be described as a policy of prohibition, exemptions being made in case of animals from certain countries which are required to build up the live stock of Australia and which, providing certain safeguards are enforced, may be introduced without risk.

All animals which it is sought to introduce into this country, must be accompanied by certificates of health from the veterinary authorities of the country of origin and declarations of the owner to the effect that the animals have not been in contact with diseased stock for prescribed periods. Foreign stock may be landed only at certain ports at which quarantine accommodation is provided. On arrival the animals are inspected on board ship by a veterinary officer, permitted to land or dispatched to a quarantine station in the case of domestic animals or to an approved zoological garden or other approved quarantine in the case of wild animals.

The period of detention in quarantine varies with the species and with the country of origin from fourteen days in the case of horses from Great Britain to sixty days for dogs or cattle. The animals are inspected weekly by a veterinary officer and the opportunity is taken to carry out such biological tests and make such special examinations as are necessary. The mallein test is applied to horses, the tuberculin test to cattle, sheep are dipped as a protection against the introduction of external parasites, cattle are searched regularly for *Hypoderma bovis*, the agglutination test for *Micrococcus melitensis* is applied to goats and an examination of fæces for evidences of parasitic infestation is carried out in the case of all dogs. At the termination of the period of detention the animals are inspected and handed over to the owners.

Necessary precautions are also taken to prevent the introduction of animal products which might be the means of introducing disease communicable to man, unless such products have undergone the required processes of disinfection or sterilization and are accompanied by certificates from the veterinary or health authorities of the exporting countries. These products are chiefly hides and skins, hair, bristles, sausage casings and sinew waste.

The necessity for an efficient animal quarantine service must be obvious to anyone who considers the relationship of Australia to the Asiatic countries in which most of the contagious diseases mentioned exist, and in which some are very prevalent. Continued increase in traffic and commercial intercourse with nations to the north bring with them a concurrent increase in risk.

The only disease mentioned above against which effective measures are taken in this country, and the only one in which it is really necessary, is anthrax. The disease is notifiable and under the *Stock Diseases Act* all necessary power is granted to quarantine to destroy affected animals and carcases, to vaccinate and to insure control of movement. The result of control in conjunction with other factors, such as the subdivision of large estates, has brought about a very considerable decrease in the incidence of the disease and instances of death in man from anthrax contracted from affected animals or from the carcases of affected animals have become very rare. Every effort is made to prevent the handling and opening of carcases affected with anthrax and the occurrence of the disease is notified to the local medical men as often as possible in order to place them on their guard. While there can be little doubt as to the correct course of action in anthrax,

the same obviousness is absent when dealing with such a condition as actinomycosis. The exact relationship between the disease in man and the domestic animals is by no means clear and in the present condition of our knowledge it appears desirable to have affected animals slaughtered under veterinary supervision if they are fit for the market and can travel thereto without leading to the contamination of the pastures over which they move. The provisions of the *Cattle Slaughtering, Diseased Animals and Meat Act* with regard to actinomycosis appear unduly harsh and could be justifiable only when and where efficient meat inspection was nonexistent. When an abbatoir exists and efficient *ante* and *post mortem* examination is carried out, affected animals should be dispatched there under control and marked as suspects as, in fact they are at present.

COMMUNICABLE DISEASES COMMON TO MAN AND ANIMALS: TETANUS, BOTULISM, ANTHRAX.[1]

By H. R. SEDDON, D.V.Sc.,
Director of Veterinary Research, Department of Agriculture, New South Wales; President of the Veterinary Association of New South Wales.

TETANUS.

Incidence.

THE geographical distribution of *Bacillus tetanus* has not yet been worked out for Australia. Generally speaking it is said to be chiefly contained in soil contaminated by animal excreta. An investigation in England has revealed the following information. Six specimens of material from human beings suffering from tetanus all contained tetanus bacilli. Two hundred specimens of human fæces collected in a hospital were examined and two were found to contain tetanus bacilli. Two hundred specimens of horse fæces collected in London stables were examined and thirty-four or 17% were found to contain tetanus bacilli. Seventy specimens of soil of cultivated and waste lands were examined and thirty-three or 44·25% were found to contain tetanus bacilli.

As veterinarians we feel that we are liable to meet the bacilli especially in wounds contaminated with dust from the city streets and with dirt in and around sheep yards and shearing sheds. The disease is, therefore, encountered most frequently in horses and sheep.

The commonest cause of infection in the horse is probably a punctured wound of the foot from a picked-up nail. The commonest cause of infection in sheep is from wounds associated with shearing or castration and detailing.

It is not necessary to have a deep wound. It may arise from the development of the bacilli under a scab (local anaerobic conditions). Sometimes no wound is discoverable and in these circumstances we assume the presence of a wound in the wall of the alimentary canal.

Not all such wound infections in sheep are due to tetanus. Another common cause of wound infection is *Vibrion septique* (one of the gas gangrene bacilli). There are no definite statistics. The diagnosis of tetanus is usually made from symptoms.

Recently a very heavy mortality has been associated with the use of a dirty dip; the sheep were badly infested with grass seeds and possibly the seeds conveyed infection by tetanus bacilli. This, however, was not proved bacteriologically.

Treatment.

The treatment of tetanus in horses consists in surgical treatment of the wound. In the next place antitoxin is given. It is probably of no value in animals if given after symptoms have become manifest. It should be of value if the wound is not discovered and treated, as then it may neutralize the toxin as it is formed.

Some claim good results from massive doses.

Magnesium sulphate treatment is carried out by injecting a saturated solution hypodermically. Good results at one time were claimed for this. I have used the treatment once, but it was unsuccessful.

Sedatives are given. They include chloretone and belladonna.

Lock the loose box door. It is essential to prevent undue excitement of the animal. Visitors should not be admitted.

The treatment of sheep resolves itself into preventive treatment. During shearing antiseptic dressings should be applied to all wounds. The same holds good in connexion with tailing and marking of lambs. This is best done in temporary yards; the lambs, as soon as they are marked, should be dropped over the fence into a grassed paddock.

BOTULISM.

Botulism was, of course, first described in the human subject. A peculiar form of poisoning was first associated with the ingestion of sausages in which *Bacillus botulinus* had produced its specific toxin.

It seems to have increased in recent years. One spectacular outbreak occurred in 1922 on Loch Maree in Scotland. Many cases have been reported in recent years from the United States of America; these have been associated chiefly with the use of uncooked home canned vegetables, particularly string beans. For many years a peculiar form of poisoning of animals associated with the use of certain fodders had been recognized, but the connexion between it and human botulism was not proved till 1916, when Buckley and Shippen in the United States of America proved that the conditions were identical.

Cause.

Bacillus botulinus is the cause of the condition. At least three types are known. Types *A* and *B*

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were discovered in Europe by Van Ermengem. Type *C* was described by Bengtson in America in 1921. The parabotulinus type was described in Australia in 1921. This possibly is identical with Type *C*. It was discovered independently.

The toxin of all the types produces identical effects. Types *A* and *B* are alike morphologically and culturally. Type parabotulinus and the American Type *C* are quite distinct morphologically and culturally from Types *A* and *B*.

The types are differentiated by the fact that antitoxin to one type does not protect against other types.

The disease produced is essentially a bulbar paralysis. At first the animals are affected with paresis and later with paralysis of the muscles of prehension, mastication and deglutition. Ptosis is also present.

In animals, as in man, it takes the form of a food or fodder poisoning. This is, the toxin is preformed outside the body. A great variety of foodstuffs is attacked.

Bacillus botulinus is an anaerobe, but can develope on a surface in association with heavy aerobic growth, hence infected fodders are usually found to be mouldy, but not always.

The period of incubation is from three to five days.

Types of Disease.

In horses the disease may be acute, subacute and chronic.

In the acute form, that is after inoculation of a large dose of toxin into a horse, no symptoms appear for three days. At the end of this period it experiences some difficulty in eating followed by apparent anorexia. This may last for only a half an hour and so escape notice. Usually the first thing noticed is that the animal is found "down," unable to get up, but fully conscious; it makes paddling movements with its limbs. Death takes place from twenty-four to thirty-six hours later.

In the subacute form the symptoms of throat paralysis are manifested for about a day, then incoordination of gait appears and other symptoms of the botulinic syndrome. The animal then goes "down" and dies in two to three days.

In the chronic form there is apparent anorexia. At first there is much difficulty in eating and drinking and then total inability. The animal walks about aimlessly. This type is often termed "sleepy staggers." The horse gradually wastes and dies.

The kinds of fodder which may be toxic are hay, chaff and ensilage, particularly if mouldy, corn (maize). Sometimes the fodder appears to be quite sound; it is then assumed that small pockets of mould form which have escaped detection. The toxin is said to be very powerful; 0.1 cubic centimetre is the lethal dose for horses. As the toxin is soluble in water, it may be washed from one part of the stack to another. The disease from the above mentioned causes is usually of the acute or subacute type. In Australia the disease is often associated with use of mouse-infected fodder, such as that which follows mice plagues, when many dead as well as living mice are found in the fodder.

The disease is also seen in horses entirely pasture fed. In these circumstances it is assumed that the bacillus has been propagated and has produced its toxin in tussocks. This type of disease is seen chiefly in flooded land. It then tends to be of the chronic type.

All the types of the disease are met with in horses in Australia. Cattle fed on the fodder mentioned may develope the disease in its chronic type. Some years ago there were many cases of acute type in horses and chronic type in cattle and as throat paralysis had not been observed in acute cases in horses, the relationship between the two was not known. This was first demonstrated by Gilruth, 1911.

The disease is contracted by cattle in an entirely different way as well. Cattle pastured on country deficient in phosphorus frequently develope a depraved appetite and chew bones. It had been observed that such animals were very prone to get this chronic form of botulism, though the reason was not understood. Later a type of *Bacillus botulinus* (*Bacillus parabotulinus*) was recovered from several samples of bones, bones of carcases which had decomposed and of which the bones had become somewhat scattered.

It appears therefore that cattle may contract the disease through chewing bones containing this toxin.

Let us now consider how *Bacillus botulinus* may get into and intoxicate foodstuffs. The bacillus appears to be a saprophyte in soil and it can therefore easily get into such fodders as chaff, hay, ensilage and the like.

In the case of the cattle botulism due to bone chewing, it would appear that the organism is gathered by animals with their foods, that in that animal it does not produce any illness, but if it is present in the alimentary tract of that animal when it dies, it will invade the carcase along with other putrefactive bacteria, producing its toxin in that carcase. If, therefore, an animal eats part of that carcase, it may gather a lethal dose of the toxin. Animals suffering from the depraved appetite engendered by a soil (and therefore a plant) deficiency in phosphorus, gather and chew the bones of such carcase and become intoxicated.

From this it would follow that the disease would be enzootic in areas where the microbe is present in the soil. The incidence of the bacillus in the soil has not been worked out, but we find that the disease is enzootic, though widespread.

Further, it would follow that the bones need not be cattle bones; we have found it in sheep bones. Further we have found that the bones may be from an animal which has died from an entirely different cause.

Botulism also affects fowls, producing peculiar symptoms that go by the name of "limber neck." Peculiarly enough the toxin of Type *B* is non-toxic

for poultry, though that of Type *A* is highly toxic. Parabotulinus is non-toxic for fowls.

The toxin of the Type *B* may pass unchanged through the alimentary tract of fowls and it has happened that horses have contracted the disease by eating hay which has been contaminated by chicken excreta, the excreta being proved to contain the toxin.

Geographical Distribution.

The geographical distribution of botulinus bacilli in Australia has not been definitely ascertained. Of forage poisoning in horses sporadic outbreaks occur in this State each year. In some seasons, however, there have been in some of the States so many cases that the disease has assumed almost epizootic proportions. To our knowledge it occurs in at least New South Wales, Victoria and South Australia and cases have been met with in widely different parts of all three States, though chiefly in those districts in which the stable-fed horse population is greatest.

The condition likewise occurs in cattle in the same three States, also in Tasmania and Western Australia.

So far only *Bacillus parabotulinus C* and *Bacillus botulinus B* have been found in Australia, the latter only once. What appears to be still another type has been recovered in South Australia.

Bacteriological investigations have been comparatively few and in the case of some of the earlier toxic cultures obtained the type was not ascertained.

Frequently the investigations have been fruitless, but this is not to be wondered at when we remember that the usual incubation period of the disease is four or five days, so that the presumed toxic portion of the foodstuff will have all been consumed long before samples are obtained. It is only where large quantities of the feed are toxic that there is a reasonable chance of obtaining the toxin-producing organism.

Treatment.

As with tetanus, once symptoms have been developed antitoxin is of no avail. Further a polyvalent antitoxin must be employed, as the toxin may be of any one of the three types.

In the case of cattle, where the disease is contracted from bone chewing, the disease can be prevented entirely by providing adequate bone-meal licks to remedy the depraved appetite.

ANTHRAX.

Anthrax is a notifiable disease.

In comparing anthrax in domesticated animals and in man the following points are recognized:

In man it appears usually as a malignant pustule, also pulmonary, wool sorter's disease.

In animals except the pig and sometimes the horse, it is septicæmic.

In sheep it is always septicæmic.

In cattle it is practically always septicæmic, but is usually localized at first in the bowel.

In horses definite infiltration of the pharyngeal region, characterized by clear gelatinous œdema, is encountered. The lesions are localized to some extent, but are quite inoperable. Sometimes they are localized primarily to portion of the bowel. Thus the gelatinous infiltration of a loop or small length of bowel is seen. At a later date it usually becomes septicæmic, but this is not necessarily so.

In the pig it is usually localized to the pharynx. Gelatinous infiltration of the peri-pharyngeal tissues is noted. Occasionally it becomes completely localized and necrosis of the central part of the lesion with rupture externally and recovery may occur.

Source of Infection.

The infection is practically always by ingestion. Spores or bacilli may be taken with food.

In New South Wales it occurs in unploughed grazing land. It is essentially a seasonal disease. Cases occur in summer.

In New Zealand the disease occurs in cattle fed on turnips when they are eating out the shells. It also occurs in cattle on top-dressed pasture. The disease is contracted when there is a shoot in the grass and particles of soil on the young blades.

The disease occurs where the pasture (soil) is infected from a previous case. Animals dead of anthrax, remain unburied; their carcases disintegrate and bacilli spread over the surface of the soil. How long does soil remain infective?

In certain localities disease is enzootic, for example, in the County of Cumberland.

Anthrax is supposed to have been very prevalent in this State at one time particularly in the southern part. Yet enzootic centres are comparatively few. Why? The possible reasons are faulty diagnosis, the viability of spores is not as great as it is supposed to be (possible influence of dry hot climate). Compare India where the disease is enzootic, but the climate is hot although moist.

The disease may be accidental, arising from recent contamination of the ground or fodder by excreta, blood and so forth from an animal not known to have the disease and infective material may be spread about. This, unfortunately, is somewhat common and where it occurs a serious mortality is often present. Included in this is feeding of carcases to pigs. The disease may be spread by infected fodders. This is common in England, where it is associated with infected oil cake. It does not play a part in Australia. Infection of ground may occur from unsterilized bone manures.

In New Zealand outbreaks were repeatedly traced to the use of unsterilized bone-dust. This was obtained chiefly from India where the disease is common and no doubt gathered bones are frequently used for manure.

The New Zealand Government prohibited the importation of unsterilized bones. To insure adequate sterilization inspectors were appointed, one in India, another in Australia, to see personally that all bone-dust intended for New Zealand was sterilized. That was twenty years ago. As a result no anthrax has occurred there except an odd out-

break (about six years ago) on a property on which there had previously been an outbreak.

Infection by bone-dust does not seem to be of much importance in Australia, perhaps because manuring is not so extensive as in New Zealand, perhaps because different feeding methods are employed, probably because there is better control of anthrax and little likelihood of infected bones being used for bone-dust.

Geographical Distribution.

In this State anthrax first made its appearance about 1850 near Liverpool in the Cumberland district and as a result the disease was known for many years as "Cumberland disease." Within a few years it had spread to what we now term the central and western districts and had also appeared in Victoria and Queensland.

In spite of the fact that anthrax has existed in New South Wales for so many years, it is remarkably localized. This phase of the question has been well studied by Henry (now Chief Veterinary Surgeon), who, writing in 1922, pointed out that: "Taking the State in divisions according to its well-known geographical features, it may be said that the whole coastal area, except for one spot a few miles south of Sydney (close to the locality of the first recorded outbreak) is free." He mentioned that in 1912 deaths ascribed to anthrax had occurred at one spot on the far north-east coast, but some doubt existed as to the diagnosis. This year, however, undoubted cases of anthrax have occurred in that area. Thus the only coastal areas affected are comparatively small and are localized to spots near Sydney and in the far north-east coast.

"The tableland areas," continued Henry, "are and always appear to have remained free from the disease. This area includes the country as far west as Mudgee, Molong, Young and Holbrook. . . . The Hunter valley presents two known anthrax spots involving small groups of farms, but is otherwise free. . . . The real anthrax country occurs in a belt between the tablelands and the western plains. . . . West of a line drawn from Bourke, through Narrandera, Jerilderie and Deniliquin to Echuca the disease appears to be unknown," with the exception of two possible spots on the Darling near Bourke and Wilcannia. More recently an outbreak occurred just on the eastern outskirts of the area.

The whole of the belt is not anthrax infested; there are large areas such as the Molong district (eighty miles long and sixty miles across) and near Urana in which no case of the disease has occurred since 1915. However, there do exist in this belt somewhat well defined areas in which anthrax has occurred severely in the past and where it occasionally recurs.

Incidence of Anthrax in This State.

That anthrax was at one time a very serious cause of mortality in stock is undoubted, but there is every reason to believe that the losses have been exaggerated owing to the fact that many cases of poisoning by cyanogenetic plants were ascribed to anthrax.

In recent years, however, the losses have been comparatively light. For example, in thirty-two outbreaks in the decennial period 1912-1922 a total of 409 animals died or 14·65 per outbreak (maximum one hundred, minimum one).

The total number of outbreaks recorded during that period was seven-two and the thirty-two quoted are unselected and typical of the whole number. It may be mentioned that 174,832 sheep and 9,586 cattle received preventive vaccination.

Diagnosis.

In the great majority the diagnosis is made after death. This is especially true in primary cases. The diagnosis depends on an examination of blood smears. Anthrax outfits should be used.

Control.

The control of the disease depends on quarantine measures. Vaccination is used prophylactically. The rapidity of the development of immunity after use of Australian vaccines has not yet been investigated. Practical experience teaches that after vaccination the mortality ceases in a day or two.

In America antiserum or the combined vaccination method, serum and vaccine simultaneously, is used.

No reliable data exist in regard to the frequency of recovery, as the flocks or herds are not watched closely enough as a rule.

A SURVEY OF THE INCIDENCE OF ECHINOCOCCUS GRANULOSUS (BATSCH) OR HYDATID DISEASE IN NEW SOUTH WALES.[1]

By I. CLUNIES ROSS, B.V.Sc.,
Lecturer in Veterinary Parasitology, University of Sydney.

IN a previous paper the results of a survey of the central and southern tablelands for the incidence of hydatid disease were given and it is now possible to add those of a similar survey of the Monaro and the adjacent south coast district.

The same method of examination as that previously employed was adopted, namely the examination of the viscera of cattle and sheep at the local slaughter yards for the estimation of the incidence of the larval or hydatid stage in these animals, the local hospital records being consulted for the incidence of hydatids in man. The estimation of the degree of frequency with which the adult tape worm occurs in dogs, was again based on the results of medicinal treatment of dogs with arecoline hydro-

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bromide, since it was not possible to secure any dogs for *post mortem* examination.

Hydatid Infestation in the Monaro District.

The incidence of hydatid infestation in the Monaro is based on data obtained at Cooma and Bombala and the results of the examination of cattle and sheep and also the dog in these centres will be given together, while the figures relating to the incidence of hydatids in man as revealed by the hospital statistics will be given separately for each town.

TABLE I.
ECHINOCOCCUS INFESTATION IN ANIMALS, MONARO DISTRICT.

Animal.	Number Examined.	Number Infested.	Percentage of Infestation.	Organs in Which Lesions Occurred.
Cattle ..	11	4	36·3%	Lungs 4; Liver 3
Sheep ..	53	20	37·7%	Lungs 18; Liver 7
Dogs ..	19	6	31·5%	—

Of the dogs examined twelve were infested with *Tænia* sp. and two with *Dipylidium*.

TABLE II.
ECHINOCOCCUS INFESTATION IN MAN.—STATISTICS FROM COOMA DISTRICT HOSPITAL.

Year.	Number of Infestations.	Number of Total Patients.	Ratio of Hydatid Infestations to Total Number.
1913	0	171	—
1914	1	208	1: 208
1915-1919 ..	3	837	1: 279
1920-1924 ..	5	784	1: 157

It will be seen that there is an increase in the frequency of infestation for the last quinquennial period as compared with that preceding it. Of the persons with hydatid infestation six were males and three females.

TABLE III.
ECHINOCOCCUS INFESTATION IN MAN.—STATISTICS FROM BOMBALA DISTRICT HOSPITAL.

Year.	Number of Infestations.	Total Number of Patients.	Ratio of Hydatid Infestations to Total Number.
1885-1894 ..	1	146	1: 146
1895-1904 ..	1	194	1: 194
1905-1909 ..	0	70	—
1910-1914 ..	2	159	1: 79
1915-1919 ..	3	318	1: 106
1920-1924 ..	5	586	1: 117

It will be seen that the ratio of hydatid infestations at this hospital has remained fairly constant for the last forty years. It is only during the last ten years that any considerable number of patients has been admitted to this hospital, since prior to 1915 the number of patients never exceeded thirty-nine for any one year, whereas in 1924 the number reached one hundred and sixty.

The sexes were affected as follows: males eight, females four.

Hydatid Infestation in the Bega District.

The Bega district is very largely a dairying district in contrast to the Monaro which is almost wholly pastoral and it was therefore not easy to examine a large number of sheep at this centre. In addition since very few sheep are bred on the south coast those examined cannot be taken as indicative of the degree in which echinococcus occurs in coastal sheep. Indeed all those found infested were bred in the Monaro, two of them having only commenced their residence in Bega a very short time before their enforced translation to other spheres.

TABLE IV.
ECHINOCOCCUS INFESTATION IN ANIMALS.—BEGA DISTRICT.

Animal.	Number Examined.	Number Infested.	Percentage of Infestation.	Organs in Which Lesions Occurred.
Cattle ..	6	3	50%	Lungs 3; Liver 0
Sheep ..	5	3	60%	Lungs 2; Liver 1
Dogs ..	10	1	10%	—

Of the dogs the only one found infested was at a slaughter yard. Of the others eight were dogs used on dairy farms for rabbiting, their only food being rabbits and milk. Four dogs were infested with *Tænia* and four with *Dipylidium*.

TABLE V.
ECHINOCOCCUS INFESTATION IN MAN.—STATISTICS OBTAINED FROM BEGA DISTRICT HOSPITAL.

Year.	Number of Infestations.	Total Number of Patients.	Ratio of Hydatid Infestations to Total Number.
1905-1909 ..	5	896	1: 179
1910-1914 ..	1	567	1: 567
1915-1919 ..	5	975	1: 195
1920-1924 ..	4	1,237	1: 309

The above statistics may perhaps give a false idea of the incidence of hydatid infestation in this

Total Results of Survey of the Incidence of Hydatid Infestation in New South Wales.
Cattle and Sheep.

TABLE VI.
HYDATID INFESTATION IN CATTLE AND SHEEP.

Animal.	Number Examined.	Number Infested.	Frequency of Infestation.	Organs in Which Lesion Occurred.
Sheep ..	179[1]	64	35·7%	Lungs 53; Liver 20
Cattle ..	35	13	37·1%	Lungs 11; Liver 5

[1] The number of animals examined was 188, but as nine came from Queensland, only 179 are included.

coastal district, since a proportion of the patients no doubt came from the adjacent Monaro. Indeed at least three of the patients in the past ten years almost certainly derived their infestation in the Monaro. Of these persons seven were females and six were males.

While the above evidence as to the incidence of hydatids in those parts of the State already surveyed is based on the examination of a small number of animals, it is nevertheless sufficiently striking in its indication of the extraordinary frequency of the parasite in these animals. As a result of the inclusion of figures for the Monaro and Bega the percentage of animals infested, as determined for the central and southern tablelands, has been increased from 33% for both cattle and sheep to 37·1 and 35·7% respectively.

The diagnosis of hydatid infestation was not based solely on macroscopic characters of the lesions found, for in doubtful cases specimens were preserved and subsequently examined microscopically. It is worthy of note that on two occasions cysts of slightly more than one centimetre in diameter were found to contain scolices, this being in contrast to the experience of Dew, who found, when dealing with hydatids in the pig, cysts of even ten centimetres to be infertile.

Incidence in Man.

The incidence in man was found to be greatest in the Monaro, where at Cooma and Bombala Hospitals for the five years 1920-1924 there were ten persons infested with hydatids in a total of 1,370 in-patients, giving the high ratio of 1 in 137. It will be seen that in both these centres there appears to be little evidence of a decrease in the number of hydatid infestations in recent years.

Another centre which stands out as showing a definite increase for the past five years, is Young, where a greater number of patients with hydatids were treated during this period than during the preceding quinquennium.

It is perhaps not justifiable to consider the correlation of the degree of infestation among cattle and sheep and the dog with the incidence in man in a given district, owing to the fact that such a small number of animals were examined at any one spot, while the class of dog examined varied from place to place. It is, however, interesting to note that in the two centres in which the infestation of cattle and sheep and of the dog was uniformly high, that is in the Young-Harden and Monaro districts, we find in one the highest incidence of hydatid infestation in man, while in the other, the number of cases appears to be increasing.

In contrast to what was found in cattle and sheep, the cases of hydatids in man in which the liver was the site of the cyst, greatly outnumber those in which the lungs were affected. This finding is in agreement with what has frequently been recorded before, as for example Thomas's data of a large number of patients in Australian hospitals in whom the ratio of lung infestations to those of the liver was about 1 to 4. In cattle and sheep on the other hand the ratio was slightly more than 2 to 1.

Of the patients dealt with at country hospitals we find that fifty-one were males and fifty-one females. If on the other hand the statistics for a number of years of the Royal Prince Alfred Hospital are taken, we find that there was a slight preponderance of men affected, thus of two hundred and eighty-eight patients, one hundred and twenty-two were males and ninety-six females.

The age incidence shows tremendous range, while the youngest patient was two and a half years of age and the next three, the oldest was eighty-six.

It is perhaps advisable while considering the incidence in man to consider what justification there is for the widespread assumption that hydatids have decreased considerably in New South Wales of recent years.

As a result of the present survey we find that at the Bathurst, Mudgee, Young, Goulburn, Cooma, Bombala and Bega Hospitals during the five years 1919-1923 there have been thirty-seven cases among a total of 11,868 patients, or 1 in 320. Comparing this with previous records we find that Thomas in 1882 as a result of statistics obtained from as many hospitals in the State as was possible, found that the ratio of patients with hydatids to all patients was 1 in 380. Such a method of comparison, however, is unsatisfactory, since the centres visited by the writer appeared from the information available to be those where hydatid disease was most common.

In order to determine whether there has been an increase or decrease for the whole of the State, it is necessary to compare the total number of persons infested with hydatids from year to year. Unfortunately it is not possible to obtain accurate information of the actual number of hydatid infestations before 1907, owing to the fact that they were not recorded separately in the Statistical Register prior to that date.

In 1907 we find that there were one hundred and thirty-one patients with hydatids in a total of 43,545 patients in all hospitals in the State or a ratio of 1 in 332. The number of persons with hydatids rose to a maximum of one hundred and forty-four in 1913 among a total of 65,180, giving a ratio of 1 in 452 and then fell to a minimum of seventy-seven persons infested in 1919 out of a total of 82,555 or 1 in 1072. In 1921 we find there had been an increase in the number of patients with hydatids to one hundred and ten out of a total of 92,068 or 1 in 837, while in 1923 there were one hundred and twelve in 105,881 or 1 in 945.

It will thus be seen that there has been a very great fall in the ratio of patients with hydatids to all patients since 1907, but the decrease in the actual number for 1923 as compared with 1907 is not nearly so great as one would suppose. What is of perhaps greater importance is that since 1919 there has been a considerable increase in the number of persons with hydatids, so that in 1923-1924 there was the greatest number for a single year since 1915.

It must, of course, be remembered that little importance can be attached to the number of patients for a single year and statistics extending over a number of years are necessary before any reliable conclusion can be arrived at. This is due to the fact that the onset of symptoms as a result of hydatid infestation may be very prolonged, so that it is frequently several years from the date of infestation before the patient's condition is recorded. Quite frequently one finds it recorded that the patient has had some pain for one, two or even five years before the date on which it is recorded for statistical purposes.

Another point that must be taken into consideration when estimating the decrease in hydatid infestation is the fact that of recent years the risk of city dwellers becoming infested with this parasite has become almost negligible, as compared with conditions from twenty to thirty years ago. Thomas in 1882 found that of stray dogs in Adelaide and Melbourne 40% and 50% respectively were infested, whereas at the present day the writer in over one hundred city dogs examined in Sydney has not found a single case of echinococcus infestation. This is no doubt largely due to the introduction of more efficient systems of meat inspection and also the abolition of slaughter yards in the metropolitan areas. That city dogs in the vicinity of abattoirs may still be infested is shown by Dew's work, which revealed the fact as a result of medicinal treatment, that dogs at the Melbourne abbatoirs harboured echinococccus. Nevertheless the possibility of city dogs becoming infested has been enormously decreased of recent years. This decrease in the number of infestations with hydatids among people living in Sydney, when taken in conjunction with the very much greater increase that has taken place in the population in the metropolitan area, as compared with that of the country, would very largely account for the decrease in the ratio of patients with hydatids to all patients in the State. Thus between 1907 and 1922 the metropolitan population has increased by 63·07% compared with an increase of 21·4% for the country, while if the years from 1891-1922 are taken we find that the metropolitan population increased during this period by 145% and the country by only 62·7%. When we therefore take into consideration the probable decrease in the number of patients drawn from the city it can be seen that there has not been any great diminution of hydatid infestation of man in rural districts.

Incidence of Adult Echinococcus Granulosus in the Dog.

TABLE VII.

HYDATID INFESTATION OF DOGS.

Total Number Examined.	Number Infested with Echinococcus.	Number Infested with *Tænia* sp.	Number Infested with *Dipylidium.*
79	16	48	24

The percentage of infestation with *Echinococcus granulosus* is 20·25%. The above incidence is extraordinarily high when one remembers that its estimation depended solely on the results of medicinal treatment, with the exception of one dog. If the imperfect conditions for the restraint of dogs and the collection of fæces are allowed for, it can readily be understood that when the number of echinococcus in an individual was small it would be quite possible that they would escape detection. The above figures, therefore, must be regarded only as a minimum for the districts in question.

It was found that the number of echinococcus in individual dogs varied very greatly so that, while several dogs passed hundreds of echinococcus, in two cases but a single worm was recovered, while in two others only two worms were seen.

It was also found that the frequency of infestation showed great variation among the different classes of dogs treated, as will be seen from the following table which shows the vocations of the dogs examined and the degree of infestation for each group.

TABLE VIII.

VOCATION OF DOGS EXAMINED.

Place or Use of Dogs.	Number Examined.	Number Infested with Echinococcus.	Percentage of Infestation.
Slaughter Yards	28	7	25
Station	15	6	40
Drovers	14	1	7·1
Used for Rabbitting ..	15	1	6·6
Miscellaneous..	7	0	0

The varying degree of infestation is very interesting, illustrating as it does the primary importance of the accessibility of dogs to raw viscera of sheep and cattle upon the degree of infestation with this parasite.

Thus dogs of the first class at slaughter yards, in spite of all regulations to the contrary, have ready access to the source of infection, since the great majority of such dogs undoubtedly feed on the raw viscera of sheep and cattle, which in a number of cases they help themselves to, calmly walking into the slaughter house and seizing whatever is available. That such dogs would have ready access to lungs which have been shown more frequently to be the site of lesions than the liver, is rendered even more likely from the fact that these organs are not used for human consumption. Lungs and any livers in which there are obvious lesions, are therefore left lying on the floor, where they are readily available to dogs.

There can be no doubt that this high degree of incidence among slaughter house dogs is not only a source of danger to their owners, but also serves to give rise to wide spread infestation of stock owing to the fact that such dogs travel more or less extensively in their own district in bringing animals to the slaughter yard.

That this incidence among slaughter house dogs is not confined to any one area is shown by the fact that such dogs were found infested at Bathurst, Mudgee, Young, Harden and Bega.

Station dogs are those which are used on the station for purposes of mustering, drafting *et cetera* and in this class we find the remarkably high degree of infestation of 40%. This is no doubt explained by the fact that such dogs on stations where sheep are killed for mutton are almost exclusively fed on raw offal. In the majority of cases the dogs having driven in the sheep for slaughter, wait expectantly while it is being skinned and eviscerated and should any of the organs be obviously diseased, they are almost certainly thrown to them, while the lungs whether healthy or diseased are also fed to them. The obvious possibilities of infestation with tape worms of all kinds can be realized.

The feeding of drovers' dogs appeared to be very haphazard as far as their owners were concerned, being restricted to "a bit'er bread," while they also no doubt caught an occasional rabbit. They apparently very seldom received raw meat from their owners, though sometimes having access to it at the stations visited in the course of their business. It should perhaps be mentioned that dogs of this class examined belonged to drovers who lived in a town and travelled from place to place as their services were required.

The dogs used for rabbiting received practically no food other than the rabbits which they caught in the course of their daily work. The rabbit has commonly been credited with playing an important part in the spread of hydatid infestation, since it has been said to have frequently been found as a host of the parasite. In consequence it was to be expected that were this the case, dogs whose main occupation in life was catching and when hungry eating rabbits, would be found to be heavily infested. On the contrary, it was found that of such rabbiting dogs only one was infested with echinococcus and he apparently was one to whom rabbiting appealed rather as a pastime than as a life's work, and being a gentleman of independent means, who like most of his class preferred loafing about the town to profitable employment, he had but a week or two before joined the pack and must, therefore, have obtained this infestation prior to becoming a rabbiter.

It was not found possible to examine large numbers of rabbits' viscera, but in the few examined no hydatid cysts were found, though *Cysticercus pisiformis* and *Cœnuris serialis* were both seen. It is certain that in a number of cases supposed hydatid infestation is really infestation with *Cœnuris serialis*, the larval stage of *Multiceps serialis*, a large tape worm of the dog. While one is therefore not able to offer any conclusive evidence as to the part played by the rabbit as a factor in the spread of hydatid disease, it may be concluded that it plays a less important part than is popularly supposed.

The Relative Importance of the Various Sources of Infestation of Man with Hydatids.

(*a*) Drinking Water. In previous observations on the source of infestation of man with hydatids the major rôle has been supposed, especially as far as Australian literature is concerned, to have been played by contaminated drinking water. Thomas in his classical work even goes so far as to state that "the principal medium for the conveyance of tape worms' eggs into the domestic herbivora and man is undoubtedly the drinking water." It was supposed that the fæces of the dog drying and disintegrating liberated the contained echinococcus eggs, these then being carried by the wind, contaminated not only the pastures, but also the adjacent water supply, such as dams, pools and creeks. It was thus thought that the hot and dusty stockman dismounting at the nearest dam, drank the water on which the eggs were floating, while his dog with admirable *camaraderie* paddled and drank beside him, no doubt washing further eggs off his contaminated coat. Such a theory is at first attractive and would offer a satisfactory solution of the high incidence in man in country districts, but does not take into account the fact that women are infested in almost as great a degree as men, while children of two and three years of age are also infested. Most important of all, however, it overlooks one very important fact and that is that the eggs of parasitic helminths, whether nematode, cestode or trematode do not float, so that unless *Echinococcus granulosus* exhibits some specific peculiarity, it could not be assumed that its eggs would float.

In order to verify this point freshly passed segments of echinococcus were crushed and then washed off into a watch glass and examined under ⅔ inch objective. It was found that as was expected, the great majority of the eggs had sunk to the bottom of the water and were resting upon the glass, some, however, were seen to be floating on the surface. This apparent paradox is easily explained. The eggs of the tæniæ in addition to the thick radially striate shell or embryophore immediately surrounding the embryo, are enclosed by an outer thin and delicate shell membrane which is usually shed soon after the egg passes out of the segment of the worm, either within or outside the body of the host. Thus in the great majority of cases even when tape worm eggs are recovered from fæcal samples and such samples are taken direct from the rectum of a dog, they will be found to have lost this outer shell membrane and to present only the thick embryophore. It was found that those eggs which were floating on the surface in the case of the experiment referred to, were ones in which this shell membrane was not completely shed and thus acted as a raft to support the egg, whereas in all those eggs in which it was lacking, they had sunk to the bottom of the water. These eggs, it must be remembered, were taken from the intact segment of the worm and had been subjected to no desiccating or outside influences and their behaviour cannot therefore be regarded as indicative of what would

obtain under natural conditions. The writer is convinced that under natural conditions where fæces have dried and disintegrated, it would be quite exceptional, if possible at all, to find eggs in which this membrane had not been lost and therefore it must be concluded that echinococcus eggs would not be found floating on the surface of dams or pools or creeks and drinking from such supplies would not be attended with such risks as is commonly supposed.

In addition, however, to natural accumulations of water it was thought that house tanks might be contaminated with eggs blown into them with dust. Here the fact was overlooked that if the eggs floated they would very seldom be drawn off with the water since this would not occur unless the surface of the water in the tank fell to the level of the tap. But it must be decided what the degree of danger is from this source, as the eggs fall to the bottom. The fact that eggs blown into the tank or washed off the roof would fall to the bottom of the tank would appear to lessen the danger of infestation by this means, since taps are not placed at the lowest point of the tank, but some two inches above it and eggs would therefore not be present in the water drawn off unless (a) the suction of the water was sufficient to draw up the eggs or (b) the sediment in the tank reached the level of the tap. Until these points are elucidated we are unable to overlook this tank water as a possible means of infection of man.

In the light of the above facts, however, I do not consider that water must necessarily be regarded as unquestionably the most important method of infection of man, while in the case of stock it appears unnecessary to look beyond the contaminated pastures for the method of infestation of these animals.

(*b*) Infection through direct association with infested dogs. It remains then to consider what is the possibility of man becoming infested through contact with dogs infested with echinococcus.

Popular opinion has associated licking by dogs as the great danger of infestation with hydatids through actual contact with such dogs. This danger certainly exists when dogs, as is their custom on occasion, have been pursuing the elusive flea in the region of the hindquarters or anus where the coat is likely to be contaminated with fæces, so that the animal may readily contaminate his mouth parts with eggs. This is a more probable method of infection in young children than in adults.

Perhaps a greater source of danger exists from the fact that dogs' coats may be soiled with fæces and dust containing numerous eggs, so that persons patting or fondling them might carry eggs away on their hands and then in preparing food or eating without thoroughly washing, they would be very liable to contaminate it. If one considers the conditions under which a great number of dogs on stations are kept, this appears a serious source of danger. It is the custom to keep such dogs chained up or in a small yard for days together so that their fæces are passed in a small area. Such fæces dry and disintegrate and mingle with the dust which is frequently inches deep and the dogs on lying down cover themselves with dust and at the same time numerous eggs. If children are allowed to handle and play with such dogs, the danger of their becoming infested is obvious. This is all the greater in the case of very young children who are quite likely to pick up and suck any object that excites their interest. The writer had the danger that exists from this source very clearly demonstrated when visiting a drover's home in order to examine his dogs. The drover's small son was crawling about round the kennels and was patting and being licked by the dogs and one of these same dogs on being treated was found to be heavily infested with echinococcus. Fortunately the Australian stockman wastes little time in caressing his dogs which no doubt accounts for the fact that his infestation with hydatids is not more common.

In addition the danger of eggs contaminating raw vegetables used for salads has been pointed out and this no doubt is a source of some danger where such vegetables are not thoroughly washed. Just what is the relative importance of these various methods of infestation is hard to estimate, but it would appear that the danger of infestation through the drinking water has in the past been exaggerated and too little attention has been paid to the danger of infestation through contact with dogs. Considerable light might be thrown on these points by observations on the viability of the eggs under varying conditions of heat and moisture, from which valuable conclusions might be drawn as to the relative importance of the several methods on infestation.

Prophylactic Measures.

The consideration of prophylactic measures may be considered from the standpoints of preventing infestation of dogs and preventing infestation of man.

Canine Prophylaxis.

It is proposed firstly to consider how the infestation of dogs may be prevented for only by this means is it possible to break the life-cycle and thus ultimately to control the parasite.

The primary importance of preventing infestation of the dog has been emphasized by other workers, such as Dévé and Blanchard, since they realized that only through the reduction of the infestation of dogs will the constant danger to man be diminished.

In considering how this may best be affected it will be convenient to consider the problem as affecting the two more important classes of dogs concerned, that is slaughter yard and station dogs.

There are several obvious measures which if possible of enforcement would greatly lessen the degree of infestation among slaughter house dogs. Firstly there is the enforcement of regulations forbidding dogs having access to slaughter houses and also prohibiting the feeding of raw blood and viscera to dogs or other animals connected with such places.

It is to be feared, however, that the existing conditions will always obtain in spite of insistent regulations to the contrary, while the present system of slaughtering in country districts remains. The numerous small slaughter yards scattered round any small country town make any adequate supervision impossible. It is feared that this will never be remedied until an adequate system of meat inspection for country districts is developed. It appears inconsistent and inequitable that concurrently with the enforcement of stringent regulations to protect the health of the city dweller, the same abuses that are so rigorously interdicted in the city, should go unheeded in the country. It can be said that to all intents and purposes there is no inspection of the meat supply for the great majority of country towns, even in the case of "cities" of considerable population, such as Bathurst and Goulburn. If instead of the seven or eight small slaughter yards at which the killing for each of these centres is done, a single municipal abattoir were established at which all killing of stock for other than home consumption had to be carried out, it would then be possible to employ an inspector who would inspect and condemn all carcases or organs containing lesions. Not the least important part of the work would be the insuring that all condemned viscera were suitably treated before feeding them to dogs or other domesticated animals. That diseased viscera do escape detection at the present time was illustrated to the writer during a recent visit to a country slaughter house when a liver hanging up with the carcase of a sheep ready to go into the town for sale, was found to contain a hydatid cyst. Though not in itself a danger to the health of a human being, it is obvious that other lesions of direct pathogenic importance might as readily escape detection. In another case, owing to the temporary failure of the water supply at a slaughter yard the carcases were being washed down with water taken from a pool in the paddock surrounding the slaughter house. A dog which had the free run of this paddock, was infested with echinococcus.

Educational Measures.—As has been suggested by Blanchard, much good might be accomplished by placing in all slaughter houses attractive and striking posters depicting the dangers of feeding raw offal to dogs, as directly affecting the butcher. That butchers and slaughtermen do run considerable risk from continuously associating with infested dogs was also well illustrated to the writer when visiting a slaughter yard in the Young district, where treatment of the four dogs showed two of them to be heavily infested and on inquiry he was informed that the owner was at that time in Sydney to undergo an operation for hydatids.

As has been mentioned the danger from station dogs exists owing to the fact that their food is usually raw offal and the fact that viscera are diseased makes it but the more certain that they will be fed to them. No regulation forbidding this practice is, of course, of any practical value and it would appear that educational methods are the only ones that are likely to be conducive to the improvement of existing conditions. A widespread dissemination of a knowledge of the life-cycle of the parasite in country districts and the emphasizing of the danger that exists from the practice of feeding raw viscera, especially such as are obviously diseased, to dogs would be of appreciable benefit. At the same time the fact that cooking of meat renders it innocuous might lead to the more general adoption of this as a routine measure and to a considerable reduction of the amount of infestation among this class of dog.

Human Prophylaxis.

Educational Measures.—The first measure that should be adopted is an intensive campaign to make all country dwellers familiar with the life-cycle of the parasite, the various ways in which man can contract infestation and how they may very largely prevent their dogs from becoming infested. The more important features that should be urged are: that if dogs are not fed on raw meat they will not be a source of danger to man; therefore all meat should be cooked and this is especially important in the case of meat rejected for human consumption owing to the fact that it is obviously diseased. The next points are that children should not be allowed to handle dogs, especially when very young or to crawl about in the vicinity of dog kennels and that food should never be eaten after handling dogs without thoroughly washing the hands. Then there is the necessity of thoroughly washing all salads or raw vegetables in running water before eating them, the expedient that all fæces and *débris* surrounding dog kennels or in dog yards should be collected regularly and burnt. It is essential that all station dogs and slaughter house dogs should be treated periodically with a reliable tæniacide and that all fæces passed after treatment should be burnt. It is considered that treatment with arecoline hydrobromide once every three months would be adequate. The echinococcus requires seven weeks after the eggs have been swallowed till the mature tape worm is developed and fresh eggs are passed by the dog, so that it is considered that treatment at intervals of three months would be sufficient for practical purposes. This treatment would cost about threepence per dose for large dogs and could be easily prepared and administered. Since it has been found to be 100% effective for the larger tape worms of the dog, it is probable that this drug would be equally effective for echinococcus, though the actual degree of efficacy has not been ascertained. The possible danger from drinking unboiled water should also be mentioned, especially water drawn off when tanks have run low and containing sediment.

It may be argued that this knowledge has long been possessed and that steps have been taken in the past to inform country dwellers of the more important points in connexion with this problem. While this is admitted, the success that has attended this campaign in the past is slight, since one finds on inquiry in country towns that not only is the general public quite oblivious of the danger of

hydatid infection, but even medical men who have performed numerous operations for hydatids, are often ignorant of the essential features in regard to the method of infection or of the necessity of adopting prophylactic measures. It is necessary then to decide how best the knowledge of the dangers of hydatid infestation may be spread. It would appear that perhaps the most valuable means of effecting this would be by means of instruction being given in the schools to all children concerning the life-cycle of the parasite, the methods on infestation of man and the most desirable prophylactic measures. At the same time striking coloured posters could be displayed in schools, in which the life-cycle of the parasite could be depicted and the means whereby dogs become sources of danger graphically portrayed. The same class of poster could be displayed at all slaughter yards. It is possible that the country women's associations in various parts of the State might also be availed of, especially in view of the fact that small children run considerable danger of infestation through the ignorance or carelessness of their parents.

It is to be hoped that in the near future Australia will cease to have the unenviable reputation of being the home of perhaps the most important parasitic disease common to man and domesticated animals, which carries with it the added stigma that it is preventible.

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Reviews.

A BOOK FOR THE YOUNG PRACTITIONER.

IN "An Index to General Practice," by Dr. A. Campbell Stark, the author states the book is written solely from the point of view of the general practitioner and the matter under each heading in alphabetical order is a syllabus of the subject rather than an attempt to instruct.[1]

The notes on drugs are grouped alphabetically under one heading and to several sections the author has added a small bibliography. The first heading, "Alcoholism," contains many useful hints and the second, "Anæsthetics," is concise and simple, but we are unable to agree with his choice of general anæsthetics. He likes gas and ethyl chloride for small operations and for longer anæsthesia he believes in starting with ethyl chloride given by the open method and then in going on to a mixture of "one dram of chloroform to four ounces of ether." The safety and simplicity of straight out ether anæsthesia produced by either the open or closed method apparently does not weigh with him. Birth control is shortly considered. Good advice is given about patients not interfering with the course of Nature and the evils of the one child family are also emphasized. Under the heading "Books," he advises well in regard to journals and books. Among the latter recommended we see such old friends as Leonard Williams's "Minor Maladies," "Symptoms and Their Interpretation" by MacKenzie, "Lectures on Rest and Pain," by Hilton, "Medical Lectures and Clinical Aphorisms" by Gee.

Under the heading "Consulting Room" the equipment is well described and the old advice is given that the patient should sit facing the light and the doctor's face should be in shadow.

Under the heading "Drugs" the authors affirms that the number which is valuable, is quite small. There is a very good and detailed description of the uses of salicylate of soda. There is no mention of mercury or of potassium iodide.

Under "Emergencies" there is a good description of how to fit up an emergency bag and what it should carry. There are many useful hints under "Finance and Book-Keeping." The ancient system of day book and ledger is favoured. Under "Practice and the Patient" comment is made on the illbred manners of some consultants and similar comment occurs in other parts of the book. The author apparently has not much love for consultants. "Urine Testing and Solutions Necessary" is shortly dealt with and the book ends with a few remarks on venereal disease.

Although the book is of necessity sketchy there are many very useful hints and it should be read with profit by the young graduate about to enter general practice.

[1] "An Index to General Practice," by A. Campbell Stark, M.B. and B.S. (Lond.), L.S.A. (Eng.), Ph.C.; 1923. London: Baillière, Tindall & Cox; Crown 8vo., pp. x. + 181. Price: 5s. net.

A TEXTBOOK ON GYNÆCOLOGY.

IN his latest work Professor Jellett has given us a "Practice of Gynæcology" embodying up to date developments in theory and practice.[1] Much of the previous edition has been rewritten and important new sections have been added.

The chapter on menstruation and its disorders has gained in clearness and proportion and Professor Jellett's attitude to endocrinology and endocrine therapy will appeal to those who seek some definite standpoint in theory and its practical application. In this connexion he is careful to point out that we are only in the experimental stage.

The chapter on inflammatory diseases of the uterus, including *inter alia* metritis and endometritis is a valuable summary of modern views. In the section on benign conditions of the endometrium he indicates the confused ideas which have centered round "chronic endometritis," a term used to cover both physiological and pathological conditions. It is only too true that in this connexion false theory has governed false practice and though the last word has not been said on this matter—the interpretation of the microscopical picture—it is fair to say that this chapter, properly understood, should determine a more conservative treatment of uterine inflammations than at present obtains.

Of cognate interest is the new chapter on implantation adenomata of the pelvis, mainly a summary of Sampson's work. Apart from the pathological interest of the subject the practical question of radical or conservative treatment receives consideration. A chapter is given to "gas inflation of the peritoneal cavity and of the Fallopian tubes," embodying the work of Rubin and Peterson and showing that the passage of gas through the tubes is a most valuable method of determining their patency.

[1] "A Practice of Gynæcology," by Henry Jellett, M.D. (Dublin Univ.), F.R.C.P.I.; Fifth Edition; 1925. London: J. & A. Churchill. Sydney: Angus and Robertson, Limited; Royal 8vo., pp. xii. + 744, with 417 illustrations. Price: 25s. net.

The chapter on sterility presents an old subject in a new and concise form and marks a distinct advance in the method of approaching one of the difficult problems of the gynæcologist. Radiotherapy in its application to gynæcological practice receives well considered treatment by Mr. Walter Stevenson. Into a lucid summary of thirty pages he has packed the results of a wide practical experience. He deals with the essentials of the subject, the agents, the technique, the indications and dangers. A definite note is sounded as to the limitations of radium therapy. This chapter adds a distinct interest and value to the volume.

In this edition Professor Jellett has added a short section on the general principles which govern gynæcological operations and discusses preoperative diagnosis, the necessity for operation, operative technique, the selection of operative procedure and after treatment. The necessity for such a summary of "Gynæcological Ethics" is obvious in a work like the one in question and in the terse and aphoristic presentation of the subject the reader will find a valuable directing influence.

In regard to operations description and illustration leave nothing to be desired. Of the making of operations—especially for the cure of uterine displacements—there is no end. Every new textbook on gynæcology offers some modification of an "old" procedure for uterine prolapse, cystocele or relaxed vaginal outlet. Professor Jellett has added in his book Fothergill's description of Donald's original operation for the radical cure of prolapse of the uterus. In Fothergill's opinion it dispenses with the necessity for perineorrhaphy, even if the perineum is badly torn. We are in agreement with Professor Jellett in his opposition to this view.

If one does not altogether see eye to eye with the author as to the value of certain operative procedures which he describes, one can at least admit that the surgical treatment of the disabilities consequent on uterine displacements and pelvic floor weakness generally has not been taken out of the domain of controversy. Professor Jellett has not overburdened his account with an embarrassment of choice of operations. The work is an excellent up to date exposition of a subject to which the author has brought the critical judgement of a wide practical experience. From every standpoint it commends itself to the student of gynæcology.

RECENT WORK IN DERMATOLOGY AND SYPHILIS.

VOLUME VII. of the "Practical Medicine Series" on dermatology and syphilis gives the gist of most of the work done in these subjects during 1924.

A great number of the dermatoses are dealt with. The association of some cases of *alopecia areata* with strabismus and the focal infection conceptions of the ætiology of *lupus erythematosus* as opposed to the tuberculous are discussed.

That metabolic disturbances in seborrhœic conditions are very important with endocrinous disorders as a contributing factor seems sound. Psoriasis is shown to be more of a familial than an hereditary disease and the ætiology seems as obscure as ever. Schamberg emphasizes the fact that a rigid low nitrogen diet is a valuable aid to treatment and also recommends the use of autoserum injections in some cases. The skin manifestations associated with leuchæmia and allied conditions are considered and various rare and interesting dermatoses are reported.

The different types of poisonous preparations that are used in the manufacture of many cosmetics, such as hair dyes, face creams, depilatories which may cause a severe dermatitis, call for special note. Many skin lesions due to occupation also receive consideration.

The chapter on the mycoses emphasizes the increasing recognition of eczematoid ringworm and its sources of infection. Treatment of this is given and also follows new ideas on treatment of other conditions.

In the section dealing with syphilis various unusual syphilitic manifestations are discussed, also complications arising after the administration of the arsenic derivatives. The spontaneous tendency to failure of reaction to the Wassermann test in some untreated patients with lapse of time is shown and this seems particularly an attribute of neurosyphilis. Failure to react may not necessarily be synonymous with symptomatic arrest.

In mentioning syphilis of the nervous system, Stokes and Shaffer find that in certain types of neurosyphilis the patient's prospects for clinical and serologic recovery are good and they describe methods of obtaining this. "Tryparsamide" treatment is shown to be not so valuable in early stages, but in neurosyphilis the improvement of the patient's general condition, physical and mental, is striking. However, the visual disturbances to which it may give rise, prevent its wide use. Bismuth preparations given intramuscularly are not considered as effective as the arsenicals. This is mainly due to the variability of absorption, uncertainty of dosage and delayed toxic effects of the former, the soluble compounds being regarded the more favourably.

Various methods of treating syphilis are considered in interesting papers and that of Brown and Pearce on treatment is important from an experimental point of view.

Altogether the authors have compiled a valuable *résumé* of the recent work done in dermatology and syphilis.

[1] "The Practical Medicine Series, Comprising Eight Volumes on the Year's Progress in Medicine and Surgery": Under the General Editorial Charge of Charles L. Mix, A.M., M.D. Volume VII.: Dermatology and Syphilis, Edited by William Allen Pusey, A.M., M.D. and Francis Eugene Senear, B.S., M.D.; Urology, Edited by John H. Cunningham, M.D.; 1925. Chicago: The Year Book Publishers. Crown 8vo., pp. 384. Price: $2.

ARTIFICIAL PNEUMOTHORAX THERAPY.

COMING as it does from the pen of Dr. J. Gravesen, Medical Superintendent of the Vejlefjord Sanatorium, "The Surgical Treatment of Pulmonary and Pleural Tuberculosis" must command the interest of all associated with tuberculosis.[1]

The work as a whole bears evidence of the reasoned judgement of a school of thought which emanated from Professor Saugman. Emphasis is laid on the fact that surgical treatment is of small value unless carried out on basic principles and that in surgical methods we have achieved merely a factor towards healing which in certain circumstances is fit to be an adjuvant to the natural restitution of a diseased body.

Whilst the author naturally emphasizes artificial pneumothorax therapy as the most suitable surgical procedure, the book is obviously compiled with the idea of detailing surgical methods now available for cases in which artificial pneumothorax therapy is contraindicated, in which it has proved impossible of accomplishment or in which having been carried out has proved ineffective for various reasons.

Indications for and against any of the discussed methods are well and lucidly elaborated.

The section devoted to pleural tuberculosis will supply the reader with much that is new and sound. The replacement of serous effusions by air and the washing out of the pleural cavity in cases of empyema will appeal to all, whilst the detailed technique given will prove distinctly valuable.

The total disregard of stereoscopic radiography is rather surprising and the use of a sharp pointed cannula in the induction of a pneumothorax even by experienced operators cannot be commended.

To those already interested in artificial pneumothorax therapy the book is a necessity, but some previous study of the subject is essential before the full value of the work may be realized.

[1] "Surgical Treatment of Pulmonary and Pleural Tuberculosis," by J. Gravesen, M.D. (Copenhagen), with a foreword by S. Vere Pearson, M.D., M.R.C.P. 1925. London: John Bale, Sons & Danielsson, Limited. Demy 8vo., pp. xii. + 155, with 87 illustrations. Price: 10s. 6d. net.

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A Retrospect.

Radiology.

THE most important piece of work to be mentioned in radiology during the year 1925 is that of Moppett on the reactions of animal tissues to monochromatic X rays of varying wave length. This work, if confirmed and extended, will open out new fields for investigation and will necessitate a complete revision of the principles on which X ray therapy is based. Moppett found that when X rays are reflected on the atomic planes of a crystal, pencils of rays of gradually increasing wave length can be projected on the surface of some selected animal tissue. Starting with a wave length of 0·055 Ångström unit and passing on through the intermediate wave lengths to 1·05 Ångström units it was possible to determine the effect of each wave length and to ascertain the shortest exposure after which the varying effects were produced. He used the chorio-allantoic membrane of an eight-day chick embryo. Atrophy was induced with rays of a wave length of 0·11, 0·53 and 0·79 Ångström unit. The atrophy was most intense at 0·11 unit. At 0·16 Ångström unit the effect was one of intense stimulation with the appearance of leucocytosis. Closer to the atrophy-producing wave length the result was a partial atrophy, but he is inclined to regard this as a complication by reflected softer rays from atomic planes deeper in the crystal. Similarly the rays of shorter or longer wave length than 0·53 or than 0·79 Ångström unit appear to give rise to stimulation and not to atrophy. While it would be out of place to speculate in this article concerning the possible significance of the actual wave lengths in their relation to the stimulatory or destructive effect, it is permissible to mention that there appears to be some evidence in favour of the hypothesis that X and other rays of definite wave length exert certain effects on tissue cells determined by their chemical constituents. More will certainly be heard of this line of research in the near future.

Diagnostic ventriculography is carried out in Australia by one or two radiologists. The first description of the findings were handed to this journal several months ago. Unfortunately there has been a considerable delay in its publication. Noble's and Monson's paper will be available within a few weeks.

Reference should also be made in this place to Flecker's description of the examination of the skull and upper portion of the vertebral column by means of what is termed the "Gargoyle position."

Much new work has been carried out in connexion with the technique of gall bladder radiology. Graham's test has been widely applied and sodium tetraiodo-phenolphthalein has almost entirely superseded sodium tetrabrom-phenolphthalein. The opacity of the former to X rays is approximately twice as great as that of the latter and in consequence a smaller dosage yields equally good results. The salt can be injected intravenously with safety, provided that the injection is carried out slowly. Rapid injection may lead to collapse which, however, can be counteracted by a hypodermic injection of extract of suprarenal gland. It has been ascertained that the normal gall bladder fills with the dye after six, twelve, fourteen or twenty hours. When the cystic duct is blocked, the gall bladder, naturally, remains unfilled. Gall stones may at times be demonstrated as translucent spaces in the skiagram surrounded by the dense shadow of the dye. French authors have employed a combination of strontium and sodium bromide and have claimed results as good as as those obtained from the use of sodium tetariodo-phenolphthalein.

The injection of "Lipiodol" into the spinal theca has proved itself to be a method of value in the diagnosis and localization of tumours of the spinal cord. About one cubic centimetre of the solution is injected into the *cisterna magna* and is allowed to flow gradually down the spinal canal. If a tumour be present, the fluid is blocked at the level of the growth. An objection has been raised that as "Lipiodol" is not absorbed, toxic effects may be

anticipated. Experience has shown, however, that untoward effects have not followed its continued presence in the spinal canal.

No material advance has been registered in the field of deep X ray therapy. The time of exposure has been considerably reduced as a result of the employment of the water-cooled Coolidge tube.

Sarcoma responds rapidly to deep X ray therapy in the majority of cases, but the greatest care has to be exercised in order to prevent underdosage, as this may stimulate the growth instead of destroying it. Radiation has been widely employed both before and after operation in carcinoma of the breast. The end results are held to be very gratifying. Carcinoma in other situations can probably be alleviated by X rays, but not cured.

Medium radiation, that is up to about one hundred and fifty kilovolts, has been employed in the treatment of diseased tonsils with success. The more cautious operators hold the opinion that this form of treatment should only be applied when operation is contraindicated; it is therefore recommended for old people, for persons with cardiac and renal disease and for hæmophilics. Better results are obtained if deep crypts are first cauterized. Unless this is done, superficial healing with inclusion of a large crypt in a shrunken tonsil is likely to take place. The result of such an inclusion is abscess formation.

The most important advance in regard to apparatus during the year has been the production of a new one hundred *milliampère* Coolidge tube. This tube has been tested to stand four hundred and fifty *milliampères* of current at about eighty-five kilovolts. The manufacturers sell it as a hundred *milliampère* tube; it has been found to stand this current for long periods. The focus is fine and detail can be obtained which was previously secured only with a ten *milliampère* radiator tube. The anticathode is of a novel design. It consists of a large block of copper with an aperture for the cathode rays to reach a small but heavy tungsten button and another aperture for the emission of X rays. An air-cooled radiator prevents the tube from becoming overheated.

Ophthalmology.

In our article last year on the progress in the science and practice of ophthalmology, the first place was given to work carried out with the aid of the Gullstrand slit lamp. During the past twelve months Spring in Australia has studied the uses and possibilities of this ingenious device and has published some highly interesting observations in these columns. The selection of the best means of illumination for the several purposes to which this lamp may be put, offers some difficulty, but at the same time presents scope for the resourcefulness of the user. The slit lamp and corneal microscope are not mere toys. They are instruments of precision which must become increasingly useful as the technique of their employment increases. Australian ophthalmologists will doubtless take up the study within a short time.

Helmholtz's theory of accommodation has of late been severely criticized by Tscherning, Johnson and others. Recent measurements of the lens at rest and in accommodation made by Fincham, however, are distinctly favourable to Helmholtz's views. The variation in the thickness of the lens capsule, noted by Finchem, explains the hyperbolic form which the lens assumes in accommodation. This phenomenon has puzzled many workers in the past.

Barraquer's cataract operation still attracts considerable attention. Cruickshank has used this operation extensively. To obtain a partial vacuum he has employed a large quantity of mercury in a U-shaped tube. He obtained good results in 88% of the patients in whom he carried out the operation and he writes enthusiastically concerning the method.

Stephansson has devised a new operation for glaucoma. The operation provides for subconjunctival drainage by means of a twisted gold wire inserted into the anterior chamber through a keratome incision at the limbus. The wire is covered by a conjunctival flap. He claims to have obtained successful results in more than three-quarters of the eyes in which the operation was carried out.

The work by Bailliart and Magitat on the intraocular circulation is of considerable importance.

They have made use of the well-known clinical phenomenon of the appearance of visible pulsation in the retinal arteries as a result of digital pressure on the eyebell. Bailliart has devised an ophthalmodynamometer which registers the pressure applied to the globe. By means of this instrument the systolic and the diastolic pressures in the retinal arteries can be expressed in millimetres of mercury. The work of these two observers has brought to light evidence of the inadequacy of the blocked filtration hypothesis of glaucoma. They hold the opinion that the most frequent cause of glaucoma is venous stasis arising from a narrowing of the chorioidal veins as a result of inflammation.

Imre and Fridenberg have published good articles dealing with the theory that primary glaucoma is one of the results of a disturbance of the balance of the glands of internal secretion.

Howard has made some important observations on the phagocytic action of epithelial cells in infections of the conjunctiva and the cornea.

Oto-Rhino-Laryngology.

The most important work in connexion with otology that has been undertaken during the year, is a systematic research on the problems and theory of hearing. Many new facts have been brought to light by the workers at the Research Laboratory of the American Telephone and Telegraph Company, New York. It is remarkable that in this investigation there was an almost complete elimination of mechanical contrivances. The minute physical forces which these observers set themselves to manipulate and to measure, are treated almost entirely as electrical quantities. The forces are more accurately controlled and more readily measured in this form. It is claimed that with the aid of a special audiometer a series of pure tones can be produced which can be varied in pitch in short steps throughout the whole scale of audibility. The loudness of each tone can be varied throughout the scale and the loudness of the tone impinging on the ear drum can be measured in units, called dynes. By means of wave filters components of a compound tone of any given frequency can be eliminated before the compound tone reaches the receiver. The components of a compound tone can be analysed in respect to frequency and intensity by means of electrical analysers and compound tones can be synthetized from pure tones of any chosen frequency, intensity or phase relationship. One of the most valuable features of these researches is the detailed analysis that they afford of the various elements of speech.

The examination of the otolithic function has proved to be of great importance in modern otology and has been pursued by many workers. Quix, Bárány and Mygind have each made valuable contributions to the knowledge of labyrinthine function. It has been shown that the semicircular canals and the otoliths are separate organs of sense, each with its own function, although they cooperate in the function of maintaining the equilibrium. Mygind has recently announced his opinion that caloric nystagmus consists of two reactions, the one giving a reversion by forward bending, the other not doing so. The former is a semicircular canal reaction, while the latter is an otolithic reaction.

Sturm has published his findings in connexion with intralabyrinthine pressure balance. He has demonstrated that in the absence or occlusion of the round window any excursion of the footplate of the stapes exerts a greater pressure wave both in the perilymph and in the endolymph than when the round window is intact. This is not in accord with the teaching of Schafer and other physiologists. He shows further that the perilymph has an outlet through the aqueduct of the cochlea and the endolymph through the *ductus endolymphaticus*. The mobility of the stapes depends on the patency of the aqueducts of the cochlea and vestibule and is not influenced by the absence of the round window.

Züng-Burguet has introduced an instrument called the electrophonoide for use in the treatment of chronic progressive deafness. It reproduces the sound vibrations of the whole gamut of the human voice and in consequence conveys a physiological stimulus to the ear.

Hirsch has investigated the development of nasal polypi. He has come to the conclusion that recurring polypi arise from the presence of catarrhal inflammation of one or more accessory sinuses. The polypi most frequently originate in the maxillary antrum and not in the ethmoid cells.

Attention has recently been paid to nasal, aural and other forms of sepsis as the essential factors in functional psychoses, ranging from slight blunting of intellectual activity, neurasthenia and hypochondriasis to the graver manifestations of mental disease.

In the treatment of œsophageal cancer Hill has used radium for the period of fifteen years. Although the treatment has been limited to relatively few patients, he has sufficient evidence to summarize his results. In about one-third of the patients remarkable improvement was obtained, a substantial improvement was secured in an equal number and in the remaining third no benefit was derived.

The injection of five cubic centimetres of "Lipiodol" through the bronchoscope into the two main bronchi in bronchiectasis has been found by Hill to yield clear details in skiagrams for the purpose of lung mapping.

A method of demonstrating fish bones in the œsophagus has been devised. Six to eight small pieces of cotton wool teased out to the size of a shilling are soaked in barium porridge and given to the patient to swallow. A minute or two later a teaspoonful of barium porridge is taken by the patient. The œsophagus is then examined by X rays.

Favourable reports have appeared on the usefulness of "Mercurochrome 220 Soluble" in general septicæmia following mastoiditis and its complications. The preparation is administered by intravenous injection.

A new synthetic anæsthetic agent called "Tutocain" has been introduced. Those who have used it, claim that it is efficient, non-irritant and non-toxic.

Dermatology.

Little that is new has been written during the past twelve months in dermatological literature, although much in the nature of clearly described case reports of high didactic value has been published.

Fukamachi has endeavoured to review the whole literature of the ætiology of cancer with a view to the determination of the essential factors. He finds that the well-known theories of Thiersch, Cohnheim, Ribbert, von Hansemann, Hauser, Hertwig and Ehrlich fail to account for all the facts. He is not prepared to support a parasitic theory, while he maintains that the assumed internal ætiological factors, such as age, heredity, embryonic rests, metabolic disturbances and connective tissue changes, appear to be of smaller importance than the external factor of chronic irritation. The precancerous dermatoses seem to give a clue to the pathogenesis of cancer, but until the chemistry and physiology of the epithelial cell are better understood, it is improbable that a full understanding of the subject will be gained.

Some careful work has been carried out in connexion with recent outbreaks of fungoid diseases of the skin. While the common cause of microsporosis in man is *Microsporon audouini*, a considerable variety of lesion is encountered in outbreaks. It is stated that types vary from the vesico-pustular *tinea tonsurans* to true kerion. A mild *forme fruste* without exanthem has been observed. At times this *forme fruste* is caused by *Trichophyton tonsurans*. Some interesting information concerning these affections has been given by Finnerud. Akin to this matter is a peculiar mycotic affection of the nails of fruit canners. According to Kingery and Thienes a yeast-like organism has been isolated from the paronychial lesions. This organism gave rise to a similar lesion when inoculated into antimals and human beings.

McKee and Andrews have studied some developmental defects involving the ectodermal tissue. The chief characteristics of the condition are absence of the sweat glands, absence of the pilo-sebaceous apparatus, dental aplasia, thin, dry and glossy skin with a tendency to the formation of papular rashes and intolerance to heat.

The relation of erythrodermia and lymphatic leuchæmia and aleuchæmic lymphadenosis has been discussed at a meeting of the Dermatological Section of the Royal Society of Medicine. While some important facts were brought to light, the prevailing difference of opinion tended rather to confuse the issues.

Considerable attention has been directed within recent times to a condition described by Lutz under the name of *nodosités juxta-articulaires*. The nodules are not adherent to the skin. It is suggested that the condition is due to syphilis or frambœsia. It simulates a condition known as subcutaneous fibroid syphiloma.

Reference should be made to some reports concerning alarming nitritoid crises following injections of bismuth preparations and melanosis following the injection of arsenobenzol drugs. The latter condition is similar to if not identical with the melanosis formerly observed after medication with inorganic preparations of arsenic. These ill effects occurring in the treatment of syphilis are sufficiently uncommon to be ignored.

J. W. Dawson has made an exhaustive study of melanomata and concludes that all tumours of this nature are of epithelial origin.

Morphology.

It is impossible within the compass of a column or two to summarize all the more important work in morphology that has been offered to the world during the past twelve months. For the purposes of this article a few of the most evident advances will be mentioned, particularly those which have been recorded in the British Empire and in the United States of America. Reference was made last year to the work of Potts on the main peripheral connexions of the human sympathetic nervous system. Hovalacque has published an admirable description of the cervical sympathetic system. Lightoller has worked on the musculature of the face. He has made some original contributions to the understanding of the action of the facial muscles. In this connexion it is of interest to note that use was made of slow motion cinematography of the facial movements. This method is being employed for motion analysis in clinical medicine, industrial research and in pure science.

Grafton Elliot Smith has published a summary of the work of John Irvine Hunter. Unfortunately he has credited Hunter with work originated and carried out by Royle. The lectures are in consequence in need of revision, but in other respects they represent a masterly review of Hunter's work.

Wood Jones has conducted some valuable researches in mammalian and marsupial morphology and in the physical anthropology of the Australian aborigines. Campbell has presented some very valuable information on the dentition and palatal structure of the Australian aboriginal man.

In topographical anatomy steady progress has been registered. Mention may be made of the work of Gladstone and Wakely on the variations of the occipito-atlantoid joint in its relation to the metameric structure of the cranio-vertebral region. Cairney has dealt with anomalies of the subclavian and internal carotid arteries.

In comparative morphology Woollard has written on the cortex of Tarsius, while Clark's work on the visual centre of primates is also worthy of special mention.

Two early skulls have been described after reconstruction. The Taung skull was described by Dart, while Elliot Smith dealt with "the Lady of Lloyds."

Some interesting work has been carried out on the postnatal changes in the cerebral vascularity, particularly in the region of the cerebral cortex, of the albino rat. It appears that there is a distinct correlation between the vascularity and observed activity. The work of E. R. Clark and E. L. Clark upon the "Rouget" cells of the capillaries is of importance, since they have shown that these cells are not contractile as has been taught.

Micro-dissection is becoming used with increasing frequency. Renyi and Chambers have employed it in their studies of the bladder and intestinal epithelium and of human epidermis. This work may be found to be of distinct value in regard to some problems in pathology.

In regard to embryology mention should be made of some excellent work by Senior on the correlation of varieties of the pelvic vessels with the embryonic channels and that by McClure and Butler on the development of the *vena cava inferior* in man.

British morphology has suffered severely during the year by the death of Professor N. Kulchitsky at University College, London, of Dr. Sonntag, Prosector to the Zoological Society, and Professor John Cleland, Professor of Comparative Morphology.

Abstracts from Current Medical Literature.

OPHTHALMOLOGY.

Causes of Myopia.

G. LEVINSOHN (*Archives of Ophthalmology*, September, 1925) claims that myopia is due to the bending of the body and head in near work. He disagrees with Steiger who places heredity as the causal factor, asserted by the compression of ocular muscles. There is no increase of intraocular tension during accommodation and the pressure on the eye by convergence is extremely small. The bent body and head cause the eye to fall forward by gravity, it promotes congestion and stretching in its weakest place the *lamina cribrosa*. The author's experiments with dogs and monkeys proved that the horizontal position of the eye is sufficient to produce an axial myopia in animals in a relatively short time (several months) and this myopia will increase the longer the experiment lasts.

The Circulatory Régime of Glaucoma.

A. MAGITAT AND P. BAILLIART (*American Journal of Ophthalmology*, October, 1925) discuss the retinal circulation and ocular arterial and venous pressure in relation to glaucoma. In a normal person the diastolic tension of the retinal artery is from thirty to thirty-five millimetres of mercury and the systolic about seventy millimetres. The venous pressure is in equilibrium with the ocular tension. Occasionally a chorioidal artery may be seen and its tension observed with the ophthalmo-dynamometer. From these observations and from theoretical considerations it may be assumed that the retinal and chorioidal arterial pressures are identical and probably also the venous pressure. In the glaucomatous eye there is found not only a higher arterial pressure, but what is more important, a higher ratio between the general and local arterial tension. The pressure in the veins remains in equilibrium with the ocular tension, otherwise the walls of the veins would collapse. The dilatation of the episcleral vessels characteristic of glaucoma is the result of increased venous pressure. Compressed in the interior of the eyeball by the ocular tension, they dilate as soon as they leave the enclosed medium. Hence increased ocular tension is accompanied by increased venous pressure in both chorioidal and retinal systems. The volumetric total of the retinal veins is insignificant compared with that of the chorioidal veins, so it is the latter that is capable of and probably does play an active part. It is generally believed that it is the ocular hypertonia that engenders the venous stasis, but many clinical facts and anatomical considerations make it even more probable that it is venous stasis which causes the increased ocular tension. Clinical material is quoted showing the presence of inflammatory foci along the trunk of the vortex veins, also endophlebitis with obliteration and venous stasis. Many inflammations of the anterior segment are accompanied even by hypotonia. Thus to produce hypertonia it is necessary that the inflammation should affect the venous system or that the capillaries should dilate. There is an analogy in *phlegmasia alba dolens*. Ligature of the vortex veins in animals causes hypertension, shallowness of the anterior chamber, cloudiness of the cornea and cupping of the disc. The tension approaches normal after ten days with the formation of collateral vessels in place of the vortex veins. It is of clinical importance to compare the ocular tension with the general arterial pressure. Retinal arterial pressure is half the brachial pressure. If the ocular tension reaches the level of the diastolic retinal pressure, pulsation will be seen in the retinal arteries and a danger point is reached. Miotics will not lower the tension and operation is indicated.

Vision in "Tryparsamide" Treatment of General Paralysis.

J. H. ROTH (*Illinois Medical Journal*, September, 1925) has studied the vision of patients with general paralysis of the insane treated during the last year with "Tryparsamide." This drug, released only this year by the Rockefeller Institute for the treatment of general paralysis, is a pentavalent, arsenical compound closely related to "Atoxyl" and "Arsacetin," drugs which have an especial affinity for the optic tracts. It was first used for trypanosomiasis and is noted for its low antispirochætal action, but also for high penetrability and rapid excretion. Most patients excrete 88% to 95% of the drug in twenty-four hours, but some individuals retain more and are susceptible to cumulative effects. Especially with arteriosclerosis observed in the fundus, a frequent condition in neurosyphilis, the ophthalmic surgeon should be wary of elimination and on the first indication of narrowing fields should either reduce the dose or stop the treatment and dehydrate the patient as rapidly as possible. This may be accomplished by intravenous or rectal injection of a 15% solution of sodium chloride. Some writers do this before intravenous injection of arsenic to increase the penetration of the drug. In the present series the patients were dehydrated by being made to sweat daily in a cabinet. Saline aperients were used and strychnine was given hypodermically. Thirty-six patients took the treatment. The fields were examined in twenty-two patients. In five cases the fields were reduced, in twelve increased and in five they remained stationary. Among the control patients the fields were diminished in 62%. It is concluded that "Tryparsamide" may be given in neurosyphilis with safety to the optic nerve, provided the patient is watched by the ophthalmologist.

Gold Wire Operation for Glaucoma.

J. STEPHANSSON (*American Journal of Ophthalmology*, September, 1925) has devised the operation of inserting a loop of gold wire into the anterior chamber for glaucoma. A twenty-two carat gold wire one-fifth of a millimetre in thickness and eighteen millimetres long is bent together at the centre. The ends are bent at right angles and made smooth and the loop is twisted. The wire, having the shape of a T, has a perpendicular of three millimetres with a base of four millimetres. The perpendicular loop is inserted through a kerotome incision at the limbus, the base of the wire resting snugly in the depression at the sclero-corneal junction. The conjunctival flap is not sutured. The results were failures in 10%, partial failures in 12% and successes in 78% of cases.

Phacœrisis.

M. M. CRUICKSHANK (*British Journal of Ophthalmology*, July, 1925) reports the result of operation on one hundred and fifteen consecutive cases of cataract by Barraquer's method. These were performed in Shikapur, Sind. A diminished pressure of forty-five centimetres of mercury was secured by two mercury chambers holding three hundred cubic centimetres of mercury connected by a stout rubber tube, fitted with the mercury valves and capable of being raised and lowered as required. The erisiphake used was circular, five millimetres in diameter and devised by Greene, of San Francisco. Barraquer's erisiphake is the better instrument as with it the operator has sole control of vacuum. Reflected light is necessary. The pupil is dilated. A conjunctival flap is made with the corneal incision and the conjunctival suture inserted. A peripheral iridectomy may be performed, but it is not necessary. The erisiphake is applied to the lens correctly and connected with the tube rapidly and firmly to avoid the drawing in of air. After the correct manœuvres for tumbling the lens it is extracted and the eye is bandaged. Amongst an illiterate people of different languages it is impossible to express accurately visual results. In fifteen instances the cataract had to be extracted by another method. Successful cases numbered 85%, unsucccessful 8% and moderately good 4%. Vitreous loss occurred in 3%. One of the worst complications is iris prolapse. The author admits the risks and difficulties of the operation, but considers they are outweighed by the advantages. The operator should be familiar with the technique of intracapsular extraction by Smith's method.

The Determination of Retinal Blood Pressure.

J. E. LEBENSOHN (*Illinois Medical Journal*, September, 1925) bases an article on retinal blood pressure on the work of Bailliart whose monograph he is translating into English. Normally the retinal pulse can be

observed only with the magnifying ophthalmoscopic of Gullstrand, but with pressure on the globe an arterial pulse will appear. Further pressure increases the amplitude of pulsation up to a certain point after which the pulse slips and the artery will be effaced. Bailliart, of Paris, has designed a spring tension instrument for compression of the eyeball which he has called an ophthalmo-dynamometer. The graduations are in grammes of water and the graduated rod measures up to one hundred and fifty grammes. As soon as the pulse appears, the reading is noted. The pressure is then continued until the pulse disappears when a second reading is made. The pressure necessary to produce pulsation measures approximately the diastolic pressure in the retinal artery. Bailliart has constructed a tube, enabling him, knowing the initial intraocular tension, to translate the dynamometer readings into terms of millimetres of mercury. In eyes with normal tension twenty-five grammes are required to induce the pulse and sixty to seventy to obliterate it. Hence the diastolic pressure is thirty to thirty-five millimetres of mercury and the systolic sixty-five to seventy-five millimetres. In retinal hypertension the diastolic pressure may reach one hundred and twenty millimetres. It is unsafe to exert a pressure of more than one hundred and fifty grammes. The systolic pressure in these cases is expressed as greater than one hundred and fifty grammes. Sudden attacks of visual obscuration are suggestive of retinal hypertension. Normally the retinal diastolic pressure is 0·45 of the systemic diastolic pressure, but in the retinitis of pregnancy and in albuminuric retinitis it is more than proportionately elevated.

LARYNGOLOGY AND OTOLOGY.

Intranasal Surgery.

E. H. JONES (*New Orleans Medical and Surgical Journal*, September, 1925) finds Spielberg's method of submucous resection of the inferior turbinate a satisfactory method in cases of bony hyperplasia of that structure when it occludes the nasal airway. He holds that hyperplastic conditions call for surgical measures. In the case of the middle turbinate submucous resection, amputation of the anterior end and removal of turbinal cells may be employed or fracture of the turbinal attachment may suffice. When polypi are present, they should be removed. As they are caused by irritating secretion (from a sinusitis) with poor drainage, the sinusitis must be treated. When a hyperplastic middle turbinal bone causes a definite frontal sinusitis, astringents like 2% silver nitrate are useful (inhalations may irritate) or the anterior end may be removed. When correcting a deviated septum Jones amputates the end of the enlarged middle turbinate which previously had occupied the concavity of the septum.

Hay Fever from Tree Pollens.

WILLIAM SCHEPPEGRELL (*New Orleans Medical and Surgical Journal*, September, 1925) states that the pollen of certain trees as well as plants have wind-borne pollens. In the United States of America tests have shown that the pollen of certain trees may cause hay fever in subjects sensitive to their protein, namely the oaks, sycamore, box elder, poplar, cottonwood, elm, ash, willow, hickory, mountain cedar and black walnut. The pines, which generate pollens in enormous quantities, do not cause hay fever. The season of bloom of the trees is only a few weeks, but the amount of pollen generated is enormous. The sensitivity of hay fever patients to pollen should be carefully tested and the patient given the appropriate immunizing treatment. The extract is prepared and used in a similar manner to that used in other forms of hay fever, the doses being graduated from ten to five thousand units progressively. Insect pollinated trees are harmless and these include all fruit trees and most of the ornamental trees and shrubs. The planting of shade trees should be limited to those that may not be a source of discomfort to sensitive subjects.

The Accessory Sinuses in Encephalitis Lethargica.

A. LOUNDES YATES (*Journal of Laryngology and Otology*, October, 1925) found that in twenty-three cases of undoubted *encephalitis lethargica* in which he had examined the nasal sinuses, the illness in seven patients had followed an attack of acute rhinitis of the influenzal type. In five patients the illness had followed an acute rhinitis complicating a chronic rhinitis and sinusitis and eleven gave a history of long continued sinus pain or nasal dischahrge which had apparently lessened shortly before the onset of symptoms. All the patients manifested signs of nasal infection both to the naked eye and bacteriologically. The author reports having introduced 0·4% indigo-carmine solution in saline solution into the maxillary antra of four patients with total ciliary paralysis of mucus secretion. This was apparently absorbed, for it appeared in the urine in twenty minutes. Four patients with other types of sinusitis were subjected to the same test and no coloration appeared in the urine of any of them. He infers that in *encephalitis lethargica* a condition of inflammation such as has led to a lack of function of the mucous membrane occurs, resulting in a greatly heightened power of absorption of the part. From this he deduces that only those members of the community who suffer from this type of sinusitis in this region of the nose, are potential subjects of encephalitis.

Tracheotomy in Tuberculosis of the Larynx.

T. RITCHIE RODGER (*Journal of Laryngology and Otology*, October, 1925) lays stress on the necessity for physiological rest of the affected parts in the treatment of tuberculous laryngitis just as in the treatment of other parts of the body capable of movement. Enforced silence achieves to a variable extent rest from the movements involved in the production of voice, but the larynx also moves during every act of deglutition and during respiration. The glottis is closed to obtain fixation of the chest for every forceful movement of the upper limbs and for movements in which the abdominal muscles and diaphragm participate. After tracheotomy the movements consequent on deglutition are not eliminated at all, nor are they during quiet respiration. The author examined by the indirect method the larynx of a patient who had been subject to tracheotomy, while the patient was pushing forcibly with his right hand. A very considerable movement of the glottis occurred, though this was not complete. Hence absolute silence, if it can be obtained, provides almost as much physiological rest to the larynx as can be secured by tracheotomy. The operation may be considered when the patient is temperamentally incapable of observing strictly the rule of silence and it must be faced when as in any other form of laryngeal obstruction the patient cannot breathe freely. In most cases the enforcement of complete voice rest with the judicious use of the cautery and conservative measures probably offers as good a hope of recovery.

Paroxysmal Rhinorrhœa.

JAMES ADAM (*Journal of Laryngology and Otology*, September, 1925) affirms that paroxysmal rhinorrhœa connotes two things, catarrh and spasm and these are due in general to toxæmia largely produced by dietetic errors. He urges surgeons to combat this unwholesome *régime* in order to get the patient into a condition of greater resistance by which he becomes insensitive to any ordinary protein rather than to look for susceptibility to special proteins and to act solely in accordance with the findings. The aim should be to detoxicate the patient by attending to all the emunctories and make him observe a healthy life.

Vasomotor Rhinitis.

A. BROWN KELLY (*Journal of Laryngology and Otology*, September, 1925) holds that in nasal vasomotor neuroses constitutional treatment is of first importance. Even if intranasal structure defects have to be remedied, a short preliminary course of a nervine tonic is useful, especially if hyperæsthesia is pronounced. Quinine, arsenic, strychnine, phosphorus and valerian exercise a beneficial influence in many cases of paroxysmal sneezing, rhinorrhœa and obstruction.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION AND THE VETERINARY ASSOCIATION OF NEW SOUTH WALES was held at the B.M.A. Building, 30-34, Elizabeth Street, Sydney, on October 29, 1925, DR. R. J. MILLARD, C.M.G., the Vice-President, in the chair.

Communicable Diseases Common to Man and Animals.

A symposium of papers dealing with certain communicable diseases common to man and animals was presented. MR. MAX HENRY, M.R.C.V.S., introduced the subject (see THE MEDICAL JOURNAL OF AUSTRALIA, page 91). DR. H. R. SEDDON dealt with anthrax, botulism and tetanus (see page 93). MR. I. CLUNIES ROSS, B.V.Sc., dealt with hydatid disease (see page 96).

DR. R. J. MILLARD, C.M.G., thanked the three members of the Veterinary Association of New South Wales for their interesting papers. He was certain that it would open a very useful discussion and he wished to take the opportunity to extend the thanks of the Branch to their Association for having collaborated in the meeting. He regarded the diseases dealt with as very significant. He presumed that tuberculosis had not been included because this would have entailed a whole evening's discussion. He had been particularly interested in noting the excellent work that had been carried out in registering the geographical prevalence of these diseases and the dangers of spread of infection from animals to man in the affected areas. In regard to anthrax he noted that Dr. Seddon had spoken enthusiastically of the value of anthrax vaccine, especially when applied to contact animals. He would like to know if it were claimed to be of value in patients. The experience at the Coast Hospital taught him that serum treatment was of use in human beings. The majority of patients in the Coast Hospital suffering from anthrax had acquired the disease from shaving brushes. There were very few infections of the old type from hides; the latter was more virulent.

He was a little puzzled concerning Dr. Seddon's remarks on botulism. It was said to be a systemic disease. If it were merely an intoxication, how did Dr. Seddon account for the incubation period? Was botulism a septicæmia and if so, had the bacillus been recovered from the blood of the infected animals?

He was interested to learn from Mr. Ross of the comparative absence of infestation with hydatid of the Sydney dogs. He was also very interested and somewhat relieved to learn that the risk of infection through water carriage was small on account of the sinking of the eggs to the bottom of the tanks. He referred to a poster which had been issued by the Department of Public Health and which had been in use for many years in country districts, pointing out the dangers of hydatid disease and indicating the measures of prevention.

DR. R. DICK stated that anthrax had been responsible for about forty deaths during the past twenty years. Until quite recently the disease had occcurred among those who were associated with stock. More recently the incidence had altered and the disease had appeared in connexion with infected horse or goat hair. The chief source of infection had been imported shaving brushes. There had been at least thirty-three infections from this source. The organisms had been recovered from nineteen of the brushes used. Attempts to recover them from five brushes had failed, but anthrax bacilli had been found in shaving brushes from the same batch as those used by the patients. Lastly, in connexion with nine patients no anthrax bacilli had been recovered from the brushes. Eight of the patients had died which yielded a case mortality of 24%. All the patients within the metropolitan area had been treated at the Coast Hospital. Anthrax had occurred from shaving brushes in other States. The first infection had occurred in Western Australia. During the past nine years there had been fifty infections traced to shaving brushes in England which yielded a case mortality of 36%. In New York (United States of America) sixty infections had been notified in the past five years and about 50% of these had been traced to shaving brushes. In Germany there had been two hundred cases of anthrax in two years, 1921 to 1923, but only two had been due to shaving brush infection. The mortality was 15%. He remembered several outbreaks of anthrax amongst cattle in the infected area in the neighbourhood of Maitland. They had erected a barb wire fence to prevent the stock from entering the infected area. Dealing with the source of infection he referred to some court proceedings that had taken place some years previously in England, in the course of which it transpired that in many instances the infection was carried by the waste and drainage from tanneries. Dr. Dick pointed out that no anthrax infection in Australia had been traced to tanneries.

In regard to precautions they relied on the Federal authority to guard Australia to some extent against the introduction of anthrax. The measures were directed towards the exclusion of infected dead material. Proclamation had been issued prohibiting the importation of animal hair from infected areas or from countries with infected areas. Some years previously legislation had been passed in New South Wales prohibiting the sale of infected brushes. Dr. Dick pointed out that brushes were usually sent over in large consignments and that it took many years before all these brushes were sold. Under the regulations the authority was empowered to seize any shaving brush or other article if there was reasonable ground for suspecting that it was infected with anthrax. They had attempted to trace the brushes back to the wholesalers. The Act contained no provision for compensating anybody. The Department had received many demands for the return of the bulk brushes, samples of which had been found to be infected. So far they had resisted this demand, but even if the brushes were returned under compulsion, the Department had the legal powers again to seize them if there were reasonable grounds for believing that they were infected. The regulations further provided that the name of the wholesaler or retailer or their registered trade mark must be branded on the brush. Barbers were required to disinfect new brushes by immersion in 10% formaldehyde in warm water for thirty minutes. This method was not quite reliable because the formaldehyde only reached the exposed bristles and did not touch that portion of the bristle which was cemented in the handle.

Turning to the question of tetanus, Dr. Dick said that there had been about eighty deaths from this disease in the Commonwealth *per annum* and thirty in New South Wales each year. The number had varied very slightly. The infection had been traced to the excreta of horses and to soil. It was very curious in spite of the enormous increase in the number of motor vehicles, the reduction in horses in Sydney was only 2,000 over a period of ten years. Each horse produced about two bushels of manure a day. Some human beings excrted tetanus bacilli. By means of the antitoxin content of the blood it had been estimated that in China about 30% of the human population excreted the bacilli. It therefore appeared that human beings must be a source of infection. Formerly catgut had occasionally been infected. Precautions were taken to insure sterility. It had been recorded that tetanus had followed vaccination, but this accident was no doubt very rare. Tetanus was a fearful disease. During the early part of the war in France tetanus had been very prevalent among the wounded. This was before protective inoculation had been introduced; the mortality was shocking. After 1915 prophylactic doses of antitoxin had been injected into each wounded man. It had been an exception for a wounded man to arrive at the base without having had his dose. Tetanus had soon become far less frequent. It had been most fatal when associated with fractures. From five hundred to seven hundred and fifty units represented the prophylactic dose. This was repeated after ten days. Although it had been feared, anaphylaxis had not been noticed after repeated injections of serum. All kinds of treatment had been used, but none had been of real value.

In regard to chronic tetanus surgeons had even excised nerves.

Dr. Dick said that botulism was one of the American diseases that had not arrived in Australia. It was unlike ordinary food poisoning in regard to the seasonal incidence. Botulism occurred in winter, whereas ordinary food poisoning occurred in summer. From a point of view of health they were more interested in dead meat. Formerly they had regarded actinomycosis with fear. They were now of the opinion that it was not communicable from animals to men. Previously wholesale slaughter and destruction of carcases had been carried out if an animal had a swelling in the neighbourhood of the jaw. More recently partial condemnation of animals infected with actinomycosis had been practised. Dr. Dick disapproved of the permission to allow stock to travel in railway trucks if they were really diseased. Mr. Henry had advocated the expedient of sending animals suspected of actinomycosis to a central abattoir for inspection and guaranteed slaughter. He thought that this expedient should be adopted only when grave doubt as to the nature of the disease existed.

In regard to food poisoning from paratyphoid bacilli and other organisms it was probable that while the bacilli themselves were destroyed by cooking, the toxins remained intact.

In conclusion Dr. Dick referred to the leaflet dealing with hydatid disease which had been brought out by the Department several years previously. A revised edition had recently been issued.

DR. HARVEY SUTTON, O.B.E., said that he had come to learn and that he had found that his visit had not been without advantage. He congratulated Mr. Henry on his excellent introduction, Dr. Seddon on his scientific contribution and Mr. Ian Ross on his admirable account of hydatid disease.

At the last Congress on health at Melbourne it had been reported that a culture of anthrax bacilli had been kept in a laboratory for twenty-two years at the end of which time it had been successfully subcultured. In view of the resistance of the organism and of its opportunities for growing it was surprising that anthrax was not more common in Australia. New South Wales had rather more than its share. About three-quarters of the deaths from anthrax took place in New South Wales. He agreed that the hot water and formaldehyde method of disinfecting hair was very useful.

Tetanus attracted the attention of the medical profession more than anthrax did. It was a serious cause of death. During the previous eleven years anthrax had been responsible for less than ten deaths in the whole Commonwealth, while tetanus had killed three hundred and sixteen persons. This was serious when compared with the death rate from scarlet fever of seven hundred and seventeen. In regard to prophylaxis antitoxin was capable of wiping out the risk of tetanus. He referred to the experience during the war in France and at the Sinai Peninsula where operations were performed in the midst of an abundance of virgin sand. Tetanus had not been common. In France before the use of tetanus antitoxin had been adopted, the bacilli had been present in large quantities in the cultivated soil. He was convinced that in order to get tetanus there must be a dirty wound. A third factor apparently was necessary, namely an ionizable form of calcium in the wound. Dr. Sutton referred to the frequency of tetanus in persons who had suffered electric burns. He presumed that the reason for this was either the difficulty to disinfect the wound or the fact that in the attempt to disinfect it the tissues were damaged. He spoke of the chronic type which occurred in human beings, "*Kopftetanus*," and asked Dr. Seddon whether this type occurred in animals. There was a need for an organized attack on tetanus. He thought that the prospects of success were good as the disease was easily prevented by the application of simple measures.

He regarded Mr. Ross's paper on hydatid disease as of very great value. In his opinion the geographical survey of disease distribution was of the utmost importance. He was very much struck by Mr. Ross's proofs that hydatid disease was not a diminishing condition in man in many country areas of Australia. In New Zealand the Government was paying a great deal of attention to this problem. They were urging the farmers when slaughtering to boil all offal before giving it to the dogs. This was easily done and it was claimed to be of distinct value. The serious side of the hydatid problem should be presented to the people especially in the country. Dr. Sutton referred to the incidence of goitre in sheep and to the question of the association of goitre in sheep and in man with a distinct deficiency of iodine in the soil.

In regard to botulism the question of the disposal of carcases had to be taken into account. In the army they had found it quite practicable to burn all carcases. In Australia where botulism and anthrax were prevalent they found carcases rotting all over the country. A friend of his in the country had disposed of all his carcases by burning and he had told him that the result had been a definite reduction in the blow fly pest.

The veterinary profession had the advantage of the medical profession. He was reminded of a story told by Gilruth to the effect that a doctor's reputation suffered if he gave a bad prognosis concerning a man with heart disease and if the man did not die. If the veterinarian said that a horse would die before morning, "do you think" said Gilruth, "that the horse wouldn't die?" The veterinarians had the decided advantage over the health officer that they could use drastic measures and slaughter both the sick animals and all animals who were contacts.

DR. I. M. MACKERRAS produced a specimen of *Cysticercus tenuicollis* which superficially resembled an echinococcal cyst. This had been found in dog's meat which had been delivered at his own house. If cysts of this nature could get through to the city butchers, it was probable that they would be missed by the owners of dogs and would be given to the dogs. In this way isolated foci of echinococcal infection might be established in the City area.

DR. E. S. MORRIS suggested that the ultimate prophylaxis of tetanus required faith which would remove mountains of manure. Turning to the question of botulism he said that he was somewhat mystified concerning Dr. Seddon's views. He understood that it was claimed that the bacilli did not produce the disease; this was due to the toxin. How did Dr. Seddon explain the incubation period which was often of considerable length, if only toxins and no bacilli were contained in say, potted meats concerned in the outbreak. There was evidence that the Loch Marie outbreak had been dependent upon toxin of extreme virulence. The natural habitat of the organism had not been discovered. In regard to the transmission of hydatid disease there was one possible source which had not been mentioned. This source was salad vegetables. These were frequently contaminated by dogs and were eaten in an uncooked condition. He asked whether there were any means of eliminating this contamination other than boiling water without injuring the quality of the salad.

PROFESSOR J. D. STEWART, Dean of the Faculty of Veterinary Science at the Universitiy of Sydney, referred to the question of goitre in animals especially horses in the Upper Hunter Valley and in sheep in the Narrabri area. The condition responded well to potassium iodide treatment.

In regard to the incineration of carcases, he always taught and practised incineration when it was possible, but Australian conditions were such that often this could not be carried into effect, the fire risk being too great. On these occasions the carcase should be sprayed with an arsenical solution to combat the blow fly, a strong cairn of wood should be built over the carcase to be ignited when conditions were favourable.

He wished to lay stress on the importance of the first meeting of the two professions. It had been long delayed. Now that veterinary science was beginning to come into its own in Australia, the two branches of medicine might cooperate more closely in regard to the prevention and cure of disease. There were many fields of activity common to the two professions. In the past individual effort had been made, but the time had come when concerted action should be taken.

DR. BURTON BRADLEY stated that he had enjoyed listening to the three papers. He regarded veterinary research and the systematic collection of data in regard to the diseases

of animals as very valuable. Much would be gained if the incidence of tetanus were studied in the same way as Mr. Ross had studied the incidence of hydatid disease.

In his reply MR. MAX HENRY pointed out to Dr. Dick that the title of the papers indicated the restriction which they had imposed upon the discussion. He congratulated Dr. Dick's Department in adopting a rational attitude in regard to actinomycosis. He did not approve of the expedient of leaving it to an inexperienced person to determine when there was a suspicion of the disease. Animals with active disease should be destroyed as soon as possible. Suspects should be pased in under control and slaughtered at an abattoir under the supervision of an expert. This was the method which he adopted. He favoured the destruction of carcases by incineration in all cases in which anthrax was present, save when there was extreme danger of fire. There were, however, many other methods of destruction.

DR. SEDDON informed Dr. Millard that the anthrax vaccine used in veterinary practice was a vaccine containing living spores. There would probably be a grave objection to the use of this vaccine for human beings. On the other hand he had been informed by a user of the vaccine that he personally had suffered no ill effects after an accidental inoculation by pricking.

He claimed that botulism was not a septicæmia, but a true toxæmia. In animals as in man, the mortality of tetanus lessened as the incubation period increased. The ordinary treatment of tetanus in animals was to find and excise the wound as early as possible. Sometimes the wound could not be found. Antitoxin treatment was often tried and good results had been claimed after very large doses. He was very doubtful concerning its value. Some had obtained good results from magnesium sulphate. About 50% animals recovered from tetanus. One of the most important measures to adopt was to lock the stable door to prevent unauthorized disturbance of the patient. He thought that the control of anthrax in Australia was very good. He was interested to learn from Dr. Dick that anthrax had not been traced to the drainage from tanneries. On the other hand he pointed out that infected hides were less likely to be sent in to the tanneries under Australian conditions than under the European conditions. He thought that it was a pity that a sufficient quantity of shaving brushes could not be made in Australia to satisfy the requirements of the people. It had been estimated that 1% of human fæces contained tetanus bacilli. He could confirm what Dr. Harvey Sutton had stated concerning the infrequency of tetanus in Palestine. He had not seen a single horse infected and only a few in Abyssia. In connexion with Dr. Sutton's observation that tetanus was more frequent in persons who had electric burns, he pointed out that the disease was very fatal in animals after the use of the searing iron. He presumed that the dense scab formed by the burn produced anaerobic conditions for the tetanus bacillus.

In New Zealand a municipal abattoir had to be provided in every town of over a thousand inhabitants. In regard to the burning of carcases it was obvious that this was necessary to combat botulism. One man had lost ten animals in one year from botulism. The carcase had been placed in a barb wire enclosure and later other animals had broken into this enclosure. This had resulted in an outbreak.

He was satisfied that soil was a more prolific source of tetanus infection than horse dung. The veterinarians were always prepared to fight for the horse. He thought that it was very desirable to institute regular examination of soil and of fæces for the presence of the bacilli of tetanus and botulism. In conclusion Dr. Seddon thanked the members of the New South Wales Branch of the British Medical Association on behalf of the members of the Veterinary Association of New South Wales of which he was the President, for their invitation and their kind reception.

MR. IAN ROSS stated that although he was aware that a departmental poster concerning hydatid disease had been issued, he had not seen one in any part of the country. He thought that such a poster would be very valuable, particularly in regard to teaching children in schools. He thought that there had been a slight reduction in the amount of hydatid disease in the past seventeen years. He agreed that the cyst produced by Dr. Mackerras illustrated the distinct danger which there might be in spite of an organized system of meat inspection.

A MEETING OF THE WESTERN AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Children's Hospital, Perth, on October 21, 1925, DR. D. D. PATON, in the absence of the President, in the chair.

Tumour of the Parotid Gland.

DR. F. CLARK presented a patient, aged ten weeks. The mother had noticed a swelling over the angle of the lower jaw on the left side when the child was four weeks old.

The swelling occupied the whole of the left parotid region, was soft and felt cystic with the child at rest, but during feeding the swelling became hard and tense. It was obviously increasing rapidly in size and baby was losing weight.

The parotid duct was patent as evidenced by a free flow of saliva from the duct on placing an acid substance in the mouth.

Other salivary glands were normal and no enlargement of the lymphatic glands in the left side of the neck was present. The diagnosis rested between a congenital cystic condition of the parotid, a sarcoma of the parotid and a hygroma.

Dr. Clark said that it was difficult to understand the hardening of the tumour during feeding in either of the two latter possibilities. It was proposed to try aspiration of the tumour as an aid to diagnosis. This child also presented a congenital absence of the lens of the right eye.

DR. D. D. PATON stated that he was suspcious of the presence of a glioma, the eye being of the micro-ophthalmic type.

DR. CRISP suggested that as there was a small nævus under the nose, the tumour in the neck might be an angioma.

The concensus of opinion was that removal should be attempted in view of the rapidity of growth.[1]

Tuberculous Cervical Adenitis.

Dr. Clark also presented a patient, aged ten years. He had noticed a lump on the left side of the neck four months previously. It was gradually increasing in size and was becoming soft. No pain had been present at any time. The lump was situated beneath the skin just to the left of the thyreoid cartilage, was about the size of a walnut and was freely movable under the skin and over the deeper tissues.

The diagnosis offered was a tuberculous adenitis, though the gland was in an uncommon position. It had been suggested that the swelling was a thyreoglossal cyst. It was true that the down-growing thyreoglossal tract was deflected from the mid-line only where it pressed over the V-shaped thyreoid cartilage, usually to the left side. This possibility had been excluded by aspiration, the discovery of caseous material and the injection of barium cream followed by X ray examination. The resultant shadow was of very irregular outline, suggestive of the cavity in an early caseating gland.

It was proposed to remove the child's tonsils and later to remove the gland.

Encephalitis or Cerebral Thrombosis.

DR. E. A. OFFICER presented a patient, aged nine years. In June, 1924, the child had been brought to the Out-patients' Department with a history that he had been a sickly child since birth. Owing to the sister being an in-

[1] At operation this tumour proved to be a sarcoma of the parotid.

patient at the time with interstitial keratitis, a Wassermann test had been carried out and a complete positive result had been obtained.

He had been given three injections of "Novarsenobenzol" intravenously, but had developed an abscess and further antispecific treatment had been delayed until January, 1925, when he was given twelve injections of "Muthanol." Following these he had been given a course of mercury, but the Wassermann result had remained an "incomplete positive."

On October 15, 1925, he had been admitted to hospital, the mother stating that she had found him unconscious in the bed that morning, frothing at the mouth, with twitching of the face, cyanosis and rigidity of the limbs. He had had no such attack previously. There was some doubt as to his having eaten some berries on the previous day at school. The mother stated that she had had six miscarriages before the child was born.

On examination the child had been cyanosed, with motionless and expressionless face save for some occasional twitching of the eyelids. The respirations had been shallow, the pulse rapid, but of a fairly good volume. The child had been comatose.

The pupils had been equal and reacted to light and the eyes had followed the examiner, but without response from the patient.

Spastic paralysis had been present in both arms and right leg with exaggerated reflexes. The left leg had been flaccid with an active knee jerk. Superficial abdominal reflexes had been absent and a double extensor plantar response had been obtained.

The heart, lungs and abdomen had been clear on examination.

The systolic blood pressure had been 126 and the diastolic 80 millimetres of mercury. Catherization of the bladder had been carried out and no albumin, sugar or diacetic acid had been found in the urine.

Lumbar puncture had yielded clear fluid under increased pressure.

By the evening the patient had taken notice and asked for a drink of water. However, the child had not been rational and had commenced picking at the bed clothes. A few hours later the child had had a fit which lasted about three minutes. The arms were in clonic spasm, the twitching of the face was increased and a transient left internal strabismus had developed.

By October 20, 1925, the child had much improved, the paralysis was clearing so much that the child had to be restrained to prevent him getting out of bed. At the time of demonstration the mental condition did not show much improvement, though recognition of those in attendance was observed, but speech was halting and hesitating. The brisk extensor plantar responses could no longer be elicited, the responses being uncertain.

DR. W. M. MCWHAE, C.M.G., C.B.E., said that the child appeared to be suffering from either encephalitis or thrombosis and because of the rapid improvement which was taking place, he would prefer the former diagnosis.

Lichen Scrofulosus.

DR. J. E. MCGLASHEN represented a patient who was suffering from *lichen scrofulosus*. The child was the weakling of a large family. He had had an attack of pneumonia at three and a half years of age, since which he had always been ailing with minor troubles. The rash had first started at one year and ten months of age, but had not advanced very much, there being three or four small areas on each leg. There was little or no irritation with the eruption, but in various places the character of the rash had become altered by treatment and by occasional superimposed impetiginous infections.

DR. R. H. CRISP also showed a patient suffering from the same condition. This boy had attended the eye clinic of the Out-patient Department for some years for a condition which Dr. Paton had considered to be tuberculous in origin. An X ray film of the mastoid antra of the boy was viewed by those present. There had been otorrhœa from the right ear on and off for years and Dr. H. B. Gill proposed to clear out the right mastoid cells.

DR. J. E. MCGLASHEN said that he agreed that this child was also suffering from *lichen scrofulosus*.

DR. H. J. GRAY, referring to the mastoid film, said that with the lack of sclerosis as shown by the film coupled with the long history of otorrhœa he considered that the infection of the mastoid antrum was possibly tuberculous.

Tuberculous Keratitis.

DR. D. D. PATON showed a patient suffering from tuberculous keratitis, which had been treated with Dreyer's diaplyte vaccine. The child had been under treatment in the Out-patient Department for twelve months previously and the diagnosis was one of exclusion. The initial dose of vaccine had been given on May 21, 1925, the dose being one one-millionth of a milligramme. The weight of the child had then been 29·7 kilograms (four stone ten pounds). Injections had then been given at weekly intervals, increased in amount each time by one one-hundred thousandth of a milligramme until a dose of one two-hundred thousandth was reached.

Some signs of spreading had occurred after this dose, whereas up to this time a continuous improvement had been noted. The dose had ultimately been stabilized at one one-four hundred thousandth of a milligramme and the improvement still continued. The child stated that he could see better than before with this eye. The weight was 31·5 kilograms (five stone), having commenced to rise again since the dose was stabilized.

Cerebral Syphilis.

DR. J. GORDON HISLOP showed a female child, aged twelve years, who had been admitted to hospital on September 1, 1925. She had always been a bright intelligent child until November, 1924. It had then been noticed that the right eye was commencing to turn in a little. She had remained intelligent, however, until January, 1925, when she seemed frightened to put her legs forward, apparently having difficulty in noting the position into which to put her feet. In November she had commenced retching occasionally and complaining of her head. The vomiting had not been projectile then. She had been an indoor patient in a country hospital from January to March, 1925, and little history of this period was obtainable. The parents stated that the child had been worse on discharge than on admission, for she could not walk about and it was difficult to determine whether she could see at all, though at occasional times it appeared possible.

On being spoken to she would answer and would answer the first few questions quite rationally, but soon tired and usually broke out into a toneless laugh of momentary duration. Ever since she left the previous hospital she had been sucking her thumb. At the time of admission she had not vomited for ten days and at no time had the vomiting appeared to be truly projectile. The parents had also stated that the material vomited was more often froth and mucus, green in colour, rather than undigested food. There was no history of fits or epileptiform seizures. Ten days prior to admission when the headache was very severe, twitching had occurred on the right side of the body. The child had been apparently laughing in quite a meaningless way. On careful examination nothing abnormal had been discovered outside the central nervous system.

Pupils were equal and reacted to light, though the child was apparently quite blind.

The reflexes were all present and equal on both sides. The plantar responses were both extensor in type and the superficial abdominal reflexes were not obtainable.

Examination of the sensory functions was very difficult owing to the rapid rate at which the child would tire of answering questions. The laughing and whistling had been quite noticeable features during the early stages of the child's stay in hospital, but had lately been far less noticeable, though the child could still be roused to answer one or two questions.

On September 14, 1925, the Honorary Ophthalmologist had reported that there was advanced double optic atrophy

secondary to papillœdema of about thirty diopters. The Wassermann test had been carried out with the blood serum, but no reaction had been obtained.

Dr. Hislop pointed out that the child's condition had slowly became worse and that during the previous ten days the downward progression had been obvious.

Lumbar puncture had been performed on account of the severe vomiting, though the child never complained of pain or headache. Fluid had been withdrawn under normal pressure and had yielded a "partially positive" result to a Wassermann test. Prior to this the diagnosis had apparently rested between cerebral tumour and *encephalitis lethargica*, but in the light of this recent information it was possible that the condition was one of cerebral gumma. However, the child had been given considerable doses of potassium iodide since admission without any apparent result.

DR. D. M. MCWHAE,, C.M.G., C.B.E., cited a case of this type and asked for an expression of opinion on the value of cerebral decompression performed in the case of a patient such as the one being presented, whilst the ophthalmological report revealed double optic neuritis. In his opinion the condition of such patients without localizing signs, yet presenting advancing optic neuritis with perhaps some vomiting or headache was difficult to handle. If decompression were done and the patient developed optic atrophy soon afterwards, the relatives often considered the operation had caused the blindness or at least had been unnecessary. If decompression were not done and the patient had lost his or her sight, the medical practitioner considered himself culpable.

DR. D. D. PATON considered that if the optic neuritis was advancing, decompression should be performed simply on the hope of preserving the sight.

DR. B. C. COHEN instanced a case in which the eyesight had probably been retained for a short period by decompression, but he did not consider that the operation had lengthened the life of the patient at all.

DR. R. H. CRISP said that he had seen cases in which decompression had stopped the onward march of symptoms, the patients doing surprisingly well. There also appeared to be cases in which after an apparent *hernia cerebri* the symptoms ceased, the bulging over the decompression subsided and the patient returned to health save that the sight was not restored.

Dysentery.

Dr. Hislop also showed a female child, aged nineteen months, who had been admitted to hospital on September 23, 1925, with a note from the medical attendant giving the diagnosis of intussusception and stating that the mass could be felt *per rectum*.

The child had been breast fed for twelve months and the history had been uneventful. For the previous two or three weeks the child had not been well, cutting teeth and had had an ulcerated mouth for seven days. On September 19, 1925, the child had had diarrhœa, the stools being green and slimy of fluid consistence. On the evening of the same day the first blood-stained motion had been passed; it was streaked with blood. Since that there had been a motion every two or three hours, each one containing more and more blood until the last motion which was practically blood and mucus.

There was no history of the child throwing itself about or waking up screaming, but the child had been lying down dozing for the previous two days. The child on examination had been passing blood continuously, straining at very frequent intervals and the matter excreted was of the prune juice and sago character so often seen in cases of intussusception. There was a tendency towards *prolapsus recti*.

The right iliac fossa had not seemed empty to palpation and there had been no definite mass palpated in the abdomen, but the child looked very ill. Though the stool had suggested an intussusception, the absence of vomiting and restlessness and the fullness of the right iliac fossa were against the diagnosis. Under general anæsthesia no mass had been palpated and nothing was felt *per rectum*, so the child had been returned to a medical ward.

The bowel had been washed out and more blood and mucus had been passed. Subcutaneous saline solution (Locke's fluid) and antidysenteric serum had been administered during the first week and then discontinued. The diet during the first few days had been boiled water, whey and water cereals and on September 26, 1925, Bengerized milk in proportion of one of milk to two of water had been given and slowly increased.

As the blood in the stools had still persisted, bowel irrigations of a solution of silver nitrate had been given every second day for a week. The last blood-stained stool had been passed on October 11, 1925, and the child was rapidly progressing.

Culture of the stool on September 23, 1925, had yielded no spirochætes or fusiform bacilli, but great numbers of streptococci and other organisms. A culture on September 28, 1925, yielded no pathogenic organisms.

Dr. Hislop said that despite these reports there was not much doubt that the case was one of bacillary dysentery from possibly Flexner's or Morgan's Number 1 bacillus.

DR. R. H. CRISP referred to a patient whom he had seen in consultation with Dr. East. A baby of eleven months had after some hesitation been operated on as suffering from an acute surgical condition. The diagnosis of intussusception had been rejected and the condition had been considered infective. Acute appendicitis with abscess had been revealed. Dr. Crisp pointed out that this was a most unusual finding in a child so young and added one more to his already lengthy list of conditions which he had considered possible causes of an acutely inflamed abdomen in an infant.

Puncture of the Cisterna Magna.

Dr. Hislop said that he would like to bring under the notice of the meeting the method of procedure in the puncture of the *cisterna magna* when lumbar puncture was without result. Three patients had been subjected to this puncture and though all three died, it must be stated that two were *in extremis* when it was done and the third obviously very ill.

The first patient was suffering from meningitis and numerous lumbar punctures had yielded fluid under increased pressure, but the examination of this fluid had not been conclusive as to diagnosis, though it was sterile on culture and the condition was suspected of being tuberculous. At last the stage of "dry puncture" had been reached and the child had lingered on for weeks. About this time the details of the method of puncture of the *cisterna magna* had appeared in the *North American Medical Clinics* in an article on intracranial hæmorrhage in the new-born, written by Dr. Jules M. Brody.

Puncture had been performed in this case, yielding clear fluid under increased pressure which on culture yielded cerebro-spinal meningococci. A *post mortem* examination has been denied, so it was impossible to say if the condition was one of tuberculosis or of cerebro-spinal meningitis, but it suggegsted that this method might be employed in cases of dry lumbar puncture to assist in the diagnosis. The second and third patients were suffering from tuberculous meningitis, the third patient yielding a dry lumbar puncture. No difficulty had been experienced in the puncture and fluid had been obtained in the three cases.

Dr. Hislop said he would detail the directions as given by Brody and taken by him from Porter and Carter, of San Francisco, in the book on infants. These directions had been followed in the cases referred to.

The patient was placed in the lateral position as for lumbar puncture. Care was taken to maintain the alignment of the head and the vertebral column in order that there might be no torsion of the spine.

The head was moderately flexed. A lumbar puncture needle of medium bore was selected. The thumb of the left hand was placed on the spine of the axis. The needle was inserted at the mid-line just about the top of the thumb. The needle was forced upward and forward in the line of external auditory meatus and the glabella. It

was necessary to aim a little higher than the auditory meatus and when the needle struck the occiput to depress the point slightly.

The first point of resistance was piercing the skin and then the point of the needle entered the occipito-atlantoid ligament and on piercing this an unmistakable sensation was imparted to the fingers—the needle was in the *cisterna cerebello-medullaris*. It should be remembered that the needle was entering in close proximity to the medulla and great care must be exercised. It was a dangerous procedure, but care lessened the risk.

DR. R. H. CRISP in answering a question regarding the utility of this puncture, pointed out that it had been used successfully in the treatment of intracranial hæmorrhage in the new-born and that attempts could be made to wash out the spinal cavity in meningitis with basal adhesions.

Hypertrophic Pyloric Stenosis.

Dr. Hislop also presented a specimen removed at autopsy from a female child, aged two months. The specimen consisted of a stomach and duodenum manifesting gross pyloric stenosis.

The child had been breast fed for five weeks and was then weaned on account of vomiting and because the mother was experiencing increasing disability from asthmatical attacks. "Lactogen" had been tried for one feed only which the child promptly vomited. The child had retained whey quite well and also Nestlé's milk in the dilution of one in sixteen of water, but had vomited Bengerized milk one part with three of water. For three days prior to admission the child had vomited everything. The motion during this period had been scanty, but normal in colour and consistency.

On admission the child had been very ill and emaciated. Some questionable thickening over the pylorus could be felt. The vomiting was not projectile and tended to be continuous, even a teaspoonful of boiled water being vomited. One feeding of gruel had been given, but was rejected. No peristalsis had been seen. An hour or two after admission the child had collapsed and surgical operation had then been out of the question. The baby had died the following morning, the thermometer registering 42·2° C. (108° F.).

At autopsy the stenosis had been found about 2·5 centimetres (one inch) in length and about the thickness of a finger. On incision the gastric mucous membrane had been seen thrown into numerous prominent folds and the stomach wall had been leathery in consistence. On further incision down to the stenosis it had been seen that the thickening was circular in nature, the mucous membrane heavily corrugated and projecting into the stomach and the duodenum. A large sized probe had been passed through the pylorus with ease.

Vaccine in Pertussis.

DR. G. MAYRHOFER said that he wished to present in as brief a compass as possible some results of the treatment of whooping cough in children by means of the administration of vaccine. The distressing nature of this affection was only too familiar to all and the number and variety of the methods of treatment that had been advocated, were simply an indication of the meagre extent of knowledge in dealing with this widespread infection. Garlic, adrenalin, benzyl benzoate and ether given by intramuscular injection had all enjoyed their vogue, only to be rejected as uniformly unreliable. This year an attempt had been made at the Children's Hospital to treat a series of patients by vaccines only, unaided by other drug administration and the results submitted by him were a summary of forty cases picked out at random from those so treated. No method of special selection had been employed in choosing these cases exception to reject those in which the diagnosis was at all doubtful.

The vaccine employed was the vaccine prepared by the Commonwealth Serum Laboratories. This was prepared in three strengths, A, B and C.

A strength contained *Bacillus pertussis* (fifty millions), *Micrococcus catarrhalis* (fifty millions), *Bacillus influenzæ* (ten millions), and pneumococci (ten millions) in each cubic centimetre.

B strength contained *Bacillus pertussis* (four hundred millions), *Bacillus influenzæ* (fifty millions), pneumococci (fifty millions) and *Micrococcus catarrhalis* (one hundred millions) in each cubic centimetre.

C strength contained *Bacillus pertussis* (one thousand milions) in each cubic centimetre.

The doses were graduated as follows: For children under one year of age a preliminary injection of A strength vaccine, 0·18 cubic centimetre (three minims), followed by 0·5 cubic centimetre of A strength, one cubic centimetre of A strength, 0·5 cubic centimetre of B strength, one cubic centimetre of B strength and so forth, the injections being administered every other day.

Treatment in the case of children over twelve months' of age was commenced at a dosage of 0·5 cubic centimetre of A strength vaccine, the remainder of the injections following in exactly the same way.

In considering the results of treatment it was of paramount importance to be certain regarding the diagnosis and so no patient has been included in this short series who did not present a paroxysmal cough consisting of a short rapid series of expiratory efforts followed by retching or vomiting at the end of the attack.

Dr. Mayrhofer quoted the following cases to illustrate progress under treatment.

CASE I.—A child, aged twelve years, had given a history of cough for fourteen days. The cough was paroxysmal in character and the child was retching and whooping after coughing. Sometimes a slight epistaxis followed an attack of coughing. Treatment had been commenced with an injection of A strength vaccine, 0·5 cubic centimetre, the remaining injections being administered in series already described. After the third injection the mother had thought that improvement had taken place. The paroxysms of coughing had been less frequent and severe. Two days after the fourth injection the child had seemed much better.

CASE II.—A child had had a cough for over a week. At the time of the meeting it was retching and whooping after coughing. A series of injections had been administered as described. Two days after the third injection the child had been much less distressed and the paroxysms of coughing had been less frequent. Two days after the fourth injection the child had manifested rapid improvement.

CASE III.—A child, aged four years, had had a cough for three weeks. It had been whooping and vomiting after coughing for two days. Vaccine had been again administered in the routine manner. Two days after the third injection the paroxysms had begun to get less frequent and distressing. Two days after the fourth injection further improvement had taken place and two days later still paroxysms of coughing had practically ceased.

CASE IV.—A child, aged seven years, had had a cough for one month and had been whooping and retching after coughing for fourteen days. Vaccine had been administered in the routine manner. Two days subsequent to the fourth injection the child had seemed a little less distressed and two days later still had greatly improved.

CASE V.—A child, aged four years, a sister to the previous patient, had had a cough for fourteen days. The cough had been paroxysmal in character for the few days prior to the meeting. So far no whoop had been present. Vaccine had been administered as in the previous cases, no whooping had developed and the cough had begun to improve subsequent to the third injection.

CASE VI.—A child, aged five years, had had a cough for ten days. The cough had become paroxysmal in character and the patient was vomiting after coughing. Improvement had commenced after two injections of vaccine and after the fourth dose the cough had been much less distressing and frequent and vomiting had ceased.

CASE VII.—The patient had complained of a cough for a little over a week. The cough was paroxysmal in

character and the patient lost his breath and got red in the face at the end of the cough. He had not vomited. The cough had become much less distressing after the third injection and a definite improvement had been apparent after the fourth.

CASE VIII.—A child, aged twelve years, had been ill for some time, but the length of illness was not definitely ascertainable. The child was whooping and vomiting after coughing. Improvement had been noticed by the mother after the third dose of vaccine and distress had been much diminished two days after the fourth injection.

Of the forty patients twenty-three presented histories of progress similar to those enumerated. As a general rule improvement was first noted by the parents by the time the child was due for its fourth injection. Thereafter improvement set in rapidly and progress was so satisfactory that no further treatment was deemed necessary.

Fourteen patients had not improved so rapidly and these had received two additional doses of vaccine 0·5 cubic centimetre and one cubic centimetre of C strength vaccine respectively, making a total of six injections. At the end of this time their rate of improvement had likewise been satisfactory.

Three patients in the series were still whooping and retching after six doses of vaccine. In two of these instances no notes of the preceding history were available. In the third there had been a four weeks' history prior to medical advice being sought.

The time factor would seem to have some bearing on the response to treatment with vaccine.

Of the series of fourteen patients who required a series of six doses of vaccine to produce a satisfactory improvement, two had given a two weeks' history, seven a week's history and three a history of less than a week in which whooping and vomiting had been present.

Of the twenty-three patients who had responded to a series of four injections of vaccine, a history varying from three to five days of a paroxysmal cough with retching had been given.

Experience of the series of patients treated in this manner tended to the conclusion that while the actual duration of the affection was not greatly altered, the paroxysms of coughing were definitely and rapidly lessened in severity and number and further that the earlier such treatment was commenced, the more rapid and complete was the response.

No ill effects had been observed to follow the injections in any patients treated and the presence of complications such as broncho-pneumonia was no contraindication to the use of vaccine.

DR. F. W. CARTER said that he had not been having good results from the vaccine treatment of whooping cough and because in the early months of the epidemic vaccine had not produced any tangible improvement, he had abandoned its use. After listening to Dr. Mayrhofer's note he would revert to this method and hope for as good results.

DR. M. K. MOSS asked why the short interval had been adopted whereas all advice on vaccine treatment was in favour of a four or five day interval.

DR. F. GILL told of his experience in conjunction with Dr. Aberdeen, when there was a very large number of cases of pertussis in Perth, especially in Subiaco. Vaccine treatment had been used extensively, but without result until Dr. Aberdeen had taken steps to insure that the vaccine was always fresh. All the vaccine used was not kept longer than ten days or so after preparation and the results had been particularly good. The following year, although the same precautions were used, the results had not been as expected. This experience had been repeated, vaccine in some years proving extremely valuable, but in other years valueless. Dr. Gill said he thought that the results of vaccine treatment depended on whether the correct strain of the bacillus was present in the vaccine.

DR. A. W. FARMER said that he had found vaccine treatment very valuable, but his method of administration differed somewhat from that of Dr. Mayrhofer. He too had had a small proportion of cases in which no response was obtained.

DR. R. H. CRISP said that he had been using vaccine for some considerable time and had found it the one method of treatment should always be used, because though a certain proportion of patients did not respond as hoped, a very large number did surprisingly well. In those cases in which no response was obtained, he had found that injection of ether lessened the number and intensity of the paroxysms and had proved a useful adjunct to the vaccine treatment.

DR. J. GORDON HISLOP said that he wished to make it clear that Dr. Mayrhofer's note had not been compiled from a small number of cases, but that between four hundred and five hundred patients had been treated and that the cases picked out were a fair sample of the whole. In reply to Dr. Moss's question he stated that the small dosage was given on the principle that in vaccine treatment reaction should be avoided and that with these small dosages the intervals could be lessened. The results soon after the inception of this method had led him to believe that the lessening of the paroxysms occurred earlier than when the intervals between injections were longer. Dr. Hislop said that he had been very impressed by the attitude which the parents had adopted towards the vaccine treatment. When the treatment was first suggested many months previously, there had been considerable difficulty experienced in obtaining consent in the Out-Patient Department. It had not been long, however, before children with whooping cough were being brought for treatment, the parents asking that they be given the vaccine which had been recommended to them. Apart from statistical results this in itself was to his mind conclusive evidence of the value of the treatment. He believed that it was quite possible that the strain of the bacillus varied and this would account for the experience quoted by members present and for the varying results recorded by observers. It was also possible that the accompanying secondary infection also varied considerably. If it were possible, an autogenous vaccine used in each case might produce more uniform results.

Special Correspondence.

CANADIAN LETTER.

BY OUR SPECIAL CORRESPONDENT.

The Canadian Medical Association.

IT may be of interest to the medical profession in Australia to hear some details of the Canadiian Medical Association and to obtain some idea of the circumstances in which it stands. To Australians there will be little that is unusual in the mention of wide spaces and of thousands of miles between various sections of the medical community, for these conditions exist in varying degrees in both countries. The medical men of Canada have had to face the disadvantages of being very widely scattered, but thanks to the efforts of those organizing and directing the Canadian Medical Association, there has gradually grown up in this country a harmonious body which every year gives evidence of greater strength and influence for public good. The enrolled membership of the Association at the beginning of the year numbered close on three thousand and these are being steadily increased.

As regards our relations with the British Medical Association: we were favoured last winter by a visit from two of the officers of that Association, Sir Jenner Verrall and Dr. Alfred Cox, and after free discussion a form of affiliation was arrived at by which our Association, without losing any of its individuality, became affiliated with the parent society and through it with the medical profession in all the sister Dominions of the Empire. This action had been under consideration for some years and its consummation was the occasion for the expression of much cordial good feeling and the hope that it would lead to many pleasant interchanges between our Association and

the profession in Great Britain and the other Dominions. It was agreed that the existing Branches of the British Medical Association in Canada would not be kept alive any longer after certain technical details had been complied with, although of course, all members in Canada who wished to keep up their membership in the British Medical Association, can do so.

Ottawa Conference.

In the early part of the year there was held in Ottawa the first of what is hoped will be a series of conferences between the Canadian medical profession and the Government. This marked a new epoch and unequivocal proof was given of keen interest and zeal on both sides. In general the object of the conference was to discuss national problems affecting the profession; it might be supposed that this was too wide in scope to allow of anything very definite being accomplished. But so earnest was the spirit shown and so keen the discussion that it was felt that the foundations were laid of much permanent and invaluable benefit.

There were seventy-five delegates, representing every province and health board in the Dominion and it was significant of the interest being taken in medical affairs that the meeting was held under the auspices of the Minister of Health and that the Deputy Minister himself participated in the programme. There were discussions on the importance of public health, on health insurance, on the housing problems, on notification of infectious diseases and of the need for the development of a united policy as between the provinces in such a matter, for example, as that of medical registration in which, as it appears, there are great discrepancies in various parts of the country. In addition to these matters several papers were read on medical education and post-graduate instruction and here again it was felt that enormous advantages accrued from the free discussion which developed.

National Health Insurance.

In regard to health insurance, it appeared that the feeling is growing that the medical profession should study the question very fully and be ready to put forward proposals for the development of schemes in connexion therewith. It was recalled that Lloyd George in 1911 launched a bill for health insurance which it took a great many years and much labour to readjust to the liking (in even a small degree) of the profession in England. This sort of unexpected legislation it should be our aim in Canada to avoid and preliminary study by the profession of the whole question would therefore be of the greatest value.

At present only one Province, that of British Columbia, has gone into the matter in any detail. The Association in that Province has been for some time past collecting data and studying the question from different points of view. Their consideration of the matter began when some nine years ago the Government of the Province appointed a committee to go into the question of workmen's compensation for industrial accidents. Up till that time industrial companies or other employers of labour insured themselves against accident to their workmen, with resulting hardships to the workmen when they tried to prove their claims for compensation. In the first bill drafted to correct matters no mention was made of medical aid whatever. The Medical Association of the Province therefore appointed a committee which met and conferred with the commission, after having also conferred with labour representatives and the result eventually was that a medical aid clause was added to the bill.

Then came the question of medical fees and methods of administration and after some discussion the commission was persuaded of the equity of the principle of allowing free choice of doctor, with payment according to a schedule of fees. The final result was the present *Workmen's Compensation Act* (in British Columbia) which apparently works well on the whole.

This was the beginning of the investigation. When it came to the matter of insurance against sickness, the Association found that they had but few facts on which to work and therefore they appointed a statistician to go into the whole matter and to gather all the available data. Out of these certain questions arose, such as; "What form should health insurance take?" "Is there any need for such insurance and why is the present system not adequate?" "What would it cost and how should such cost be distributed and administered?" The facts gathered in this connexion were briefly summarized and sent to all the members of the profession in the Province. Round table conferences with labour are contemplated, for it is realized that medicine has no better friend than labour in this matter. British Columbia announces its willingness to send all details of the investigations it has been making along these lines to the other Provinces in the Dominion and in the meanwhile the matter has been referred to the Executive Committee of the Canadian Medical Association.

Maternal Mortality.

At the same meeting Dr. Helen MacMurchy spoke on the subject of maternal mortality in Canada. According to figures supplied by the Dominion Bureau of Statistics the total number of deaths in Canada owing to childbirth in 1922 was 1,248, making a mortality rate per thousand births of 4·9. It would appear, however, that our maternal mortality is higher than these figures indicate and a strong plea was made for increased efforts towards prenatal care. It was suggested that the attention of the provincial societies be called to the importance of the question with a view to the adoption by each society of such action as it may deem advisable.

Classification of Medical Schools.

The matter of classification of medical schools in Canada was one of our own peculiar problems. About fourteen or fifteen years ago the American Medical Association appointed a council of medical education at a time when there were about two hundred medical schools in the United States. Following that inspection this council proceeded to inspect the medical schools in Canada and to prepare a report on them, but it soon became evident to those who concerned themselves with these reports, that the criteria were not applied quite in the same way in each country. A protest was made and the classification of Canadian medical schools from the source mentioned was discontinued for the years 1921, 1922 and 1923. This year, however, there has again appeared in *The Journal of the American Medical Association* a classification of Canadian medical schools and this without any general reinspection.

Discussion on this matter brought out the following facts and views. It was pointed out that the work of the American Medical Association in the inspection of its own schools was excellent, but there are signs now that the usefulness of such classification is approaching its end. It did have the effect, however, of disciplining a certain number of American establishments whose existence was distinctly detrimental to medical education generally and indirectly this might be of some small consequence to Canadians, as there is a certain amount of interchange of medical men between the two countries. On the other hand, it was felt and clearly stated that Canadian medical schools are perfectly capable of directing and developing their own growth and have little or nothing to fear in the matter of comparison.

The frank manner in which the whole question was treated, was most wholesome and it was finally decided to refer to the Resolutions Committee for the framing of a resolution to be sent to the American Medical Association which should firmly, but tactfully reflect the feeling of the members of the Canadian medical profession in the matter.

Correspondence.

DICHOTOMY.

SIR: In your journal of 2nd inst. I note with pleasure the question "Inquirer" asks: "What are we to do here with people who can afford to pay but won't?" This is a

question that primarily affects the young general practitioner and as one of them I consider that we should be able to obtain some advice from the senior men of the profession.

To take my own case. I am the only medical man within a radius of thirty miles and during my practice of two years I have attended patients who are the proud possessors of cars and yet have no intention of paying their doctor's bills. I have been asked to visit such people time and again and yet they will not pay. I realize there is a moral obligation on my part as the only practitioner in this district to attend to them and yet there appears to be no hope of receiving any fees. I have even been called ten to twenty miles and have not even received a single penny. It is useless prosecuting them, as although they can afford to pay, most of them have no tangible assets.

I agree with "Inquirer" that a discussion will lead to uniformity of action and hope that some of the senior men will advise us younger men.

Yours, etc.,

"CH.M.," Queensland.

January 5, 1926.

Proceedings of the Australian Medical Boards.

VICTORIA.

THE undermentioned have been registered under the provisions of the *Medical Act* 1915, as duly qualified medical practitioners:

Johnston, Alfred Laurence, M.B., B.S., 1924 (Univ. Melbourne), c.o. Agent-General for Western Australia, Savoy House, Strand, London.

Eames, Edward Thomas Philip, M.R.C.S. (England), L.R.C.P., 1915 (London), D.P.H., 1925 (London), St. Ives, South Yarra.

QUEENSLAND.

THE undermentioned has been registered, under the provisions of the *Medical Act* of 1867 as a duly qualified medical practitioner:

Edwards, John Henry Drummond, M.B., Ch.M., 1925 (Univ. Sydney), Brisbane.

Books Received.

THE PATHOLOGY OF TUMOURS, by E. H. Kettle, M.D., B.S. (London); Second Edition; 1925. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 292, with illustrations. Price: 12s. 6d. net.

ULTRA-VIOLET RADIATION AND ACTINOTHERAPY, by Eleanor H. Russell, M.D., B.S. (Dunelm), and W. Kerr Russell, M.D., B.S. (Dunelm), with forewords by Sir Oliver Lodge, F.R.S., D.Sc., LL.D., and Sydney Walton, C.B.E., M.A., B.Litt.; 1925. Edinburgh: E. and S. Livingstone. Demy 8vo., pp. 262, with illustrations. Price 10s. 6d. net.

SWANZY'S HANDBOOK OF THE DISEASES OF THE EYE AND THEIR TREATMENT, Edited by Louis Werner, M.B., F.R.C.S.I., Sen. Mod. Univ. Dublin; Thirteenth Edition; 1925. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 714, with illustrations. Price: 21s. net.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii..

DEPARTMENT OF INSPECTOR-GENERAL OF HOSPITALS, SOUTH AUSTRALIA—MAREEBA BABIES' HOSPITAL: Honorary Assistant Pathologist.

ROYAL ALEXANDRA HOSPITAL FOR CHILDREN, CAMPERDOWN: Honorary Assistant Ear, Nose and Throat Surgeon.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester United Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND: Honorary Secretary B.M.A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Ceduna, Wudinna (Central Eyre's Peninsula), Murat Bay and other West Coast of South Australia Districts.
WESTERN AUSTRALIAN: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

JAN. 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JAN. 27.—Victorian Branch, B.M.A.: Council.
FEB. 3.—Federal Committee of the British Medical Association in Australia: Meeting at Melbourne.
FEB. 3.—Victorian Branch, B.M.A.: Presentation of Balance Sheet, 1925.
FEB. 4.—South Australian Branch, B.M.A.: Council.
FEB. 9.—New South Wales Branch, B.M.A.: Ethics Committee.
FEB. 11.—Victorian Branch, B.M.A.: Council.
FEB. 16.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
FEB. 24.—Victorian Branch, B.M.A.: Council.
FEB. 25.—South Australian Branch, B.M.A.: Scientific Meeting.
MAR. 3.—Victorian Branch, B.M.A.: Branch.
MAR. 4.—South Australian Branch, B.M.A.: Council.
MAR. 5.—Queensland Branch, B.M.A.: Branch.
MAR. 11.—Victorian Branch, B.M.A.: Council.
MAR. 12.—Queensland Branch, B.M.A.: Council.
MAR. 24.—Victorian Branch, B.M.A.: Council.
MAR. 25.—South Australian Branch, B.M.A.: Scientific Meeting.
MAR. 26.—Queensland Branch, B.M.A.: Council.

Editorial Notices.

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